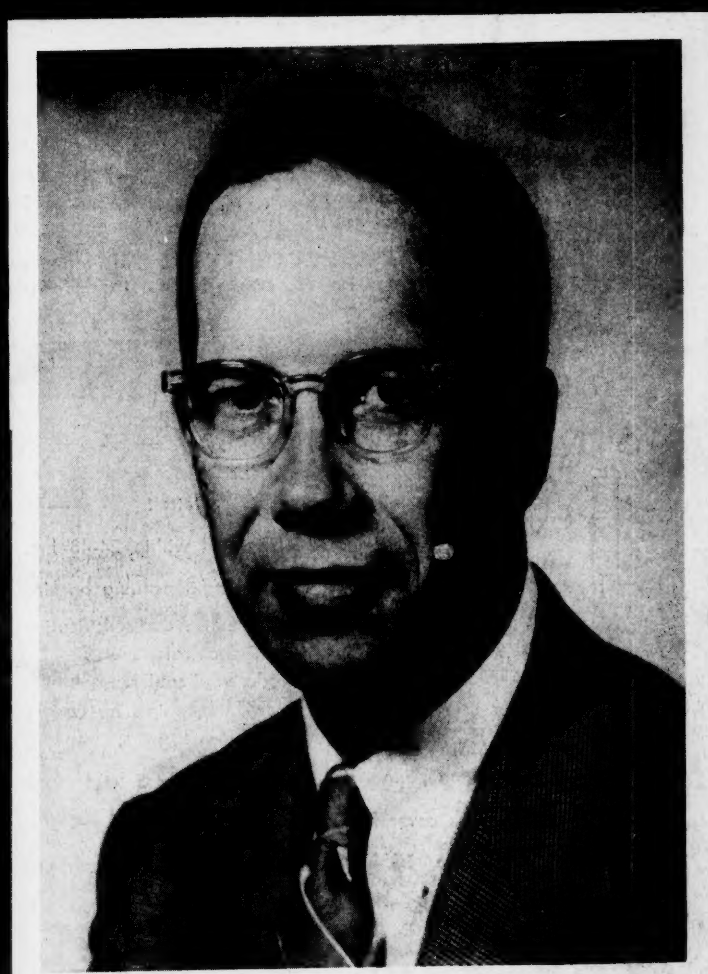
Metals Review



Metals Review

The News Digest Magazine

December 1958
Vol. XXXI, No. 12

Published monthly by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio: C. H. Lorig, President; Walter Crafts, Vice-President; R. H. Aborn, Treasurer; W. E. Jominy, Secretary; John H. Hollomon, E. E. Stansbury, Earl Parker and M. A. Scheil, Trustees; G. M. Young, Past President. Subscriptions $5.00 per year ($6.00 foreign). Single copies $1.00. Effective January 1959, subscription $6.00 a year in U. S. and Canada; foreign $7.50. Single copies $1.50. Entered as Second Class Matter, July 26, 1930 at the Post Office at Cleveland, Ohio, under the Act of March 3, 1879.

Claims for missing numbers will not be allowed if received more than 60 days from date of issue. No claims allowed from subscribers from overseas, or because of failure to notify the circulation department of a change of address or because copy is "missing from files".

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Important Lectures

Departments

ASM Review of Metal Literature

Pfann Awarded A.S.M.'s Sauveur Achievement Medal

WILLIAM G. PFANN, physical metallurgist, Bell Telephone Laboratories, Inc., Murray Hill, N. J., was the recipient of the 1958 Albert Sauveur Achievement Award of the American Society for Metals. He joins a group of international metal scientists who, since 1934, have been honored by the Society for their contributions to the science of metallurgy. Mr. Pfann received the award at the annual dinner of the Society in Cleveland on Oct. 30.

Mr. Pfann graduated in 1950 from Cooper Union in New York with a chemical engineering degree. He has been described by his associates as "one of the most brilliant and productive of scientists, a man with fresh, new, practical ideas", of which his discovery of the highly technical process of zone melting is an example.

Mr. Pfann was cited in particular for his "contributions to the fields of metallurgy, semiconductors, chemistry and solid state physics". His zone melting process produces germanium and silicon of spectacular purity. Its impact is now being felt and it is becoming more widely used throughout the world.

Other honors which have come to this young scientist include the Mathewson Gold Medal of the American Institute of Mining and Petroleum Engineers for his papers on zone melting (1955), and citations from the Cooper Union (1956) and the Clamer Medal of the Franklin Institute (1957). He has published some 20 papers and has 30 patent applications. He has lectured before A.S.M. seminars on the subject of "Liquid Metals and Solidification".

Bill is married and has three daughters. He resides in a 10-acre country home in Far Hills, N. J., which keeps him busy when he finds time to be away from the laboratory.

Other recipients of the Sauveur Achievement Award, which honors the memory of the "dean of American metallurgists", Albert Sauveur, who won fame for his pioneering work in metallography and in his capacity as a teacher, include Zay Jeffries, Walter Jominy, Edgar C. Bain, Clarence E. Sims, John Chipman and Tokushichi Mishima.

A. S. M. Plans for Mineral Garden

A.S.M. chapters and organizations in the metalworking industry are invited by the American Society for Metals to participate in an outstanding display of native minerals, to be set in the mineral garden which is to be one of the major features of the new headquarters office building now under construction east of Cleveland.

The "garden" will be 100 ft. in diameter with a 7-ft. deep saucer-like conformation in the center. Some 500 ore specimens will be attractively arranged within the circular garden which will be further enhanced by five fountains and a Y-shape foot bridge. The minerals will be displayed to facilitate study by students and spectators. Each specimen, which should be weather resistant and from 10 to 60 in. in size, will be identified and its donor designated.

"We hope that the many friends of the Society will participate in assembling mineral samples suitable for this unusual outdoor display" said Clarence H. Lorig, A.S.M. president and technical director, Battelle Memorial Institute. "When the garden is entirely 'planted' it will have outstanding artistic and geologic characteristics. Anyone who wishes to help cultivate this garden project will be warmly recognized".

The Anaconda Copper Co., Butte, Mont., has already shipped a 220-lb. specimen of copper ore to the site of the new building.

Organizations interested in participating in this project are invited to communicate with Dr. Lorig regarding general specifications and nature of the ore, shipping address, etc., at American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Missile and Rocket Components Covered

J. S. Kirkpatrick, vice-president, research and development, Brooks & Perkins, Inc., spoke on "Missile and Rocket Components" at a meeting of **Columbus Chapter.**

Mr. Kirkpatrick emphasized the need for the light metals in missiles and rocket parts. He discussed strength weight and drew comparisons between steel, titanium, aluminum, magnesium-beryllium and magnesium-lithium alloys. He pointed out that since most light metals do not move fast, they must be formed hot by hydraulic presses instead of cold worked by mechanical presses.

The speaker then gave examples of magnesium parts which offer light weight, strength, portability and erectability in all kinds of weather. He explained that missile and rocket parts are in an unusual class due to their small numbers, which necessitates that they be made in job shops with rather informal types of tooling at large cost per unit part. — **Reported by Milton J. Weiner for Columbus.**

Technical Papers Invited for A.S.M. Transactions

The Transactions Committee of the A.S.M. is now receiving technical papers for consideration for publication in the Transactions of the Society and possible presentation before the next national meeting of the Society, to be held in Chicago, Nov. 2 to 6, 1959.

Many of the papers approved by the Committee will be scheduled for presentation on the technical program of the 41st National Metal Congress and Exposition.

Papers may be submitted any time up to Apr. 15, 1959, for consideration for presentation at this convention. The selection of approved papers for the convention technical program will be made in May 1959. Manuscripts may be submitted any time during the year and upon acceptance by the Transactions Committee will be processed immediately for preprinting. All papers accepted will be preprinted and made available to any members of the Society requesting them. However, the printing of an accepted paper does not necessarily infer that it will be presented at the convention. Reprinting of accepted papers is done quarterly; notification of their availability is published in *Metals Review.*

Manuscripts in triplicate, plus one set of unmounted photographs and original tracings, should be sent to the attention of Ray T. Bayless, assistant secretary, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Should it be your intention to submit a paper, please notify A.S.M. A copy of the booklet entitled "Suggestions to Authors in the Preparation of Technical Papers" will be gladly forwarded. This booklet may help considerably in the preparation of line drawings and illustrations.

Progress in Steel Theme of Tri-Chapter Meeting

Top: C. H. Lorig, President A.S.M.; D. C. Heckard, Tri-Chapter Chairman; C. R. Austin, Kaiser Engineers; C. R. Taylor, Program Chairman; J. W. Sands, INCO; and T. L. Chase, Columbus Vice-Chairman. At right: R. Hoffman, Cincinnati Chairman; J. K. Seyler, J&L Steel Corp.; R. Clark, Atlas Steels Ltd.; W. T. Bryan, Dayton Chairman; and R. L. Gray, Armco

The theme of the 20th Annual Dayton-Columbus-Cincinnati Tri-Chapter Meeting this year was "Progress in Steel". The meeting was held in Middletown, Ohio, with the Dayton Chapter as host, with acknowledgement to Armco Steel Corp. for use of facilities, luncheon and tour.

The morning session got under way with a welcome to Middletown and Armco by T. F. Olt, vice-president, research, and the meeting was then turned over to C. R. Taylor of Armco Research Laboratories, who introduced the speakers.

C. R. Austin, manager, steel plants development, Kaiser Engineers, spoke on the "L-D Process". He covered the development, present world-wide extent of L-D plants, operating data, metallurgical considerations, necessary capital expenditures and overall economics of the process. A short film depicting the process in Austria was included.

"Continuous Casting of Steel" was the subject of R. Clark, manager of laboratories and research, Atlas Steels Ltd., who discussed problems associated with both continuous casting and subsequent processing. His slides illustrated the aspects of metallurgical quality. He then presented an economic view of the continuous casting process as developed at Atlas.

J. K. Seyler, assistant superintendent of cold finishing division, Jones & Laughlin Steel Corp. spoke on "Hot Extrusion of Steel". He described the fundamental and practical aspects of the hot extrusion process, which, although it has not been fully developed and exploited as yet, justifies continued effort because of its promise to date.

"High-Strength Alloy Structural Steels", the first lecture in the afternoon session, was presented by J. W. Sands, research associate, International Nickel Co., Inc. His talk was concerned mainly with the development and application of ultra high-strength steels of the lowered alloy types. He also covered toolsteels proposed for resistance to the elevated temperatures developed in supersonic flight. The increasingly forceful demands of rocket and missile developers for high-strength steels in thin, flat-rolled shapes were noted.

After Mr. Sands' talk, the members toured the research and steel plant facilities of Armco Steel Corp. Following dinner, R. L. Gray, president, Armco, talked on the steel industry, and C. H. Lorig, then vice-president A.S.M. and technical director, Battelle Memorial Institute, gave the keynote talk, entitled "Possible Trends in Steel". He provided evidence for the optimistic prediction of the continued phenomenal growth in steel usage in the future. The steel industry will build to new capacity and take greater advantage of its present capacity; new metallurgical developments will provide steels to meet the extreme demands of the Rocket Age.—**Reported by D. M. Ashfal for Dayton.**

History of Precious Metals Topic at Ottawa

Speaker: J. S. Fullerton

Handy and Harman, Canada, Ltd.

J. S. Fullerton, sales manager, Handy and Harmon, Canada, Ltd., addressed the **Ottawa Valley Chapter** on "Where Precious Metals Are Used".

Mr. Fullerton defined the term precious metals by sketching their historical background and describing their most distinctive properties. He stated that, speaking generally, the precious metals are so called because of their long life.

The remainder of the address was confined to describing the uses of gold in jewelry and dentistry and of silver generally.

The property of resistance to tarnish permits the use of precious metals for many very specialized purposes. Many years ago, by cleaning out a cavity in a tooth and packing it with pure gold, tooth decay was arrested. In modern practice, alloys of gold which give specific properties of hardness, strength, elasticity, toughness and resistance to fatigue have been developed for dental work.

Methods of making jewelry were described in some detail, including investment casting of gold rings by the "lost wax process".

Silver has the whitest color, the highest electrical and thermal conductivity and the highest optical reflectivity of all the metals, and is exceeded only by gold in ductility and malleability. It is one of the few metals which possesses germicidal qualities and its uses as a vessel for liquids dates far back into history.

Silver has found an important use in industry in heavy-duty bearings suitable for the tremendous speeds of conventional and jet aircraft.

Mr. Fullerton also filled in on the historical background of gold and silver, and pointed out that many cultural aspects of these metals have permeated down through the centuries to the present day.—**Reported by R. D. McDonald for Ottawa.**

INAUGURATION . . .

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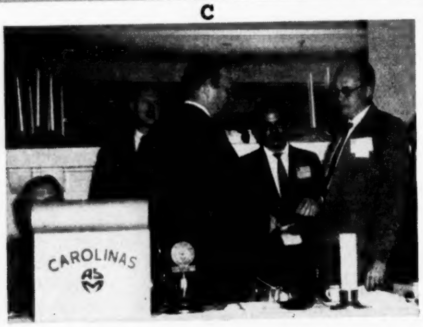

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Developments in Cold Extrusion

Speaker: J. F. Morrow
Heintz Div.
Kelsey-Hayes Co.

Members of the **Detroit Chapter** heard a talk on "New Developments in Cold Extrusion" by Joseph F. Morrow, manager, cold forming, Heintz Division, Kelsey-Hayes Co.

Mr. Morrow first discussed how Germany developed the cold extrusion of steel prior to World War II to help conserve material. Heintz started initial work in 1946, in conjunction with the U. S. Government, to survey the process as used in Germany in an effort to utilize cold extrusion as a high-production process here. Until 1950, work was on a research basis, but at that time initial efforts were directed toward producing ordnance ammunition components.

Following his presentation of the background of cold extrusion in this country, Mr. Morrow showed a sound movie of plant operations on an aircraft rocket head and explained the theory behind extrusion, pointing out some typical examples.

Basically, the process used by Heintz is called cold forming using extrusion. Conventional cold forming involves deep drawing, coining, heading, swaging, necking, etc. The two fundamental operations of extruding are backward and forward extrusion. The backward extrusion operation causes steel to flow at room temperature backward around the surface of a punch. Forward extrusion, in the case of a hollow body, is accomplished using the backward extruded cup and extending its length by pushing it over a shoulder in the die with the metal moving in the same direction as the punch.

An important advantage of this process is the improvement in physical properties obtainable in low-carbon steels, up to 0.40% C, and low-alloy steels. The raw material used is usually a hot rolled bar stock, fully killed and with a grain size of ASTM 4 to 5 or finer. Generally, the yield strength of the steel increases 2 to 3 times after extrusion over its value in the annealed state and the elongation is upwards of 9%.

Tools must be very tough and wear resistant considering the extreme loads (more than 300 000 psi.), under which they work. Heintz uses such steels as high-nickel oil hardening, high-carbon high-chromium and high-vanadium for punches and knock outs. High-nickel and other steels are used for bushings.

The saving with cold extrusion in material and labor can be exemplified by the following examples. An artillery shell, such as a 75-mm. shell weighing 8.9 lb. finished, was made from a billet weighing 9.22 lb., a loss factor of 3.4%. The labor saving on shells by this method is reflected in reducing machining operations from approximately 29 to 5. A hydraulic cylinder of high strength was designed and originally manufactured in three major pieces with the weight of the starting material being 6 lb. —tubing and two end caps—the latter two produced by hot forging. Currently, Heintz is making this piece from a billet of 1015 steel weighing 2.2 lb. The 2-lb. completed piece has finished dimensions from the press with the I.D. held to 0.002 T.I.R. and a 20 R.M.S. microfinish in the bore. Savings established to date are more than 30% over conventional methods.

A production part for automotive suspension on current models is being made from 1035 carbon steel, not heat treated. A billet of just over 4 lb. is used as compared with 7½ lb. for screw machine production. The saving in machining and labor amounts to approximately 25%.

In conclusion, Mr. Morrow emphasized the need for designers to determine and specify the strength requirement of an item rather than the material so that the increase in properties due to cold work may be utilized. Recent tool developments indicate that a much wider range of carbon and alloy steels may be extruded and that there are great potentialities for increased application of this method in American industry.—**Reported by J. D. Davis for Detroit.**

INAUGURATION

With a New Chapter Season Underway, Chapter Officers Take Over Their Duties From Departing Officers. Shown, on opposite page, are, as follows:

A *Joseph Halloran, Treasurer, John Quinn, Secretary, Fred Storm, Vice-Chairman, K. Tingley, Chairman (New Haven)*

B *W. S. Dritt, Chairman, W. O. Harms, Retiring Chairman (Oak Ridge)*

C *R. J. Polivka, Retiring Chairman, Presents Gavel to New Chairman, Jim Highsmith (Carolinas)*

D *Chairman Charles Pandelis, Retiring Chairman John Pikciunas, John Buskie, Executive Committee (Chattanooga)*

E *R. Stroker, Secretary, Q. O. Bowen, Jr., Chairman, R. R. Simonovich, Vice-Chairman, and R. Snygg, Treasurer (Rockford)*

F *W. Leslie Worth, Left, Presents Charter to George W. Beckman, Chairman (Savannah River)*

G *Incoming Chairman Ken Humberstone Presents Certificate to Past Chairman Charles Campbell (Cleveland)*

H *P. A. Lauletta, Past Chairman, F. Jaessing, Past Chairman, A. Van Echo, Immediate Past Chairman, G. Hemmeter, Present Chairman, and G. Warwick, Past Chairman (Ft. Wayne)*

M. E. I. Issues First Catalog of Study Courses

The first catalog of courses available for home study and in-plant training has been completed by the Metals Engineering Institute, a division of the American Society for Metals.

"Training Courses for the Metals Industry" describes in detail the 17 courses offered by the M.E.I., titles of the individual lessons included in each course, background on the various authors of the lesson material, and the professional background of the director and staff of the Institute. It also lists the titles of the six additional courses being readied for individual or group study. Enrollment procedures and details on how the Institute provides material and guidance for group instructors are also included.

Titles of the courses already available and listed in the catalog are:

Elements of Metallurgy; Metals for Nuclear Power; Copper, Brass and Bronze; High-Temperature Metals; Magnesium; Oxy-Acetylene Welding and Related Processes; Stainless Steels; Titanium; Tool Steels; Electroplating and Metal Finishing; Gray Iron Foundry Practice; Steel Foundry Practice; Heat Treatment of Steel; Iron Blast Furnace Operations; Primary and Secondary Recovery of Lead and Zinc; Survey of Steel Plant Processes; and Arc Welding.

The Institute, after five years of development work, was formally inaugurated in April 1957 by the American Society for Metals to help train metalworking industry personnel and to provide a means for metallurgists and personnel in allied fields to advance or to specialize within certain vital areas of the industry. Now a year and a half old, the M.E.I. recently enrolled its 1500th student.

The catalog "Training Courses for the Metals Industry" is available without charge to prospective students, to training supervisors, chapter educational committee members and other interested persons. Address requests to: Metals Engineering Institute, American Society for Metals, Dept. MR-1258, 7301 Euclid Ave., Cleveland 3, Ohio.

A.S.M. spends $44.50 to service each member of the Society for a period of one year.

CHAPTER MEETING CALENDAR

Albuquerque	**Jan. 15**		**W. Dukes**	Materials for Future Aircraft Structures
Baltimore	**Jan. 19**	Engineers Club	**W. Crafts**	Inclusion Formation in Steel
Birmingham	**Jan. 6**	Thomas Jefferson Hotel	**C. K. Donoho**	Variables Affecting the Quality of Nodular Iron
Calumet	**Jan. 13**	Phil Smidt	**M. A. Schell**	Metallurgy and Low-Temperature Testing of Flash Welded Gas Line Pipe
Canton-Massillon	**Jan.**	Mergus Restaurant	**Social**	Ladies Night
Carolinas	**Jan. 8**	Winston-Salem	**S. P. Smith**	Executives Night
Charlotte	**Jan. 9**			
Chicago	**Jan. 12**	Northwestern University	**F. B. Tatnall**	Philosophy of Measurements in Metallurgy
Chicago-Western	**Jan. 19**	Old Spinning Wheel	**P. E. Cary**	Modern Quenchants
Cincinnati	**Jan. 8**	Engineering Society	**L. P. Tarasov**	Grinding Research
Cleveland	**Jan. 5**	Engineering Society	**H. P. Croft**	Columbium
Columbus	**Jan. 7**	Broad St. Christ'n Church	**R. Wehrmann**	Preparation and Properties of Ta, Cb, W and Mo
Dayton	**Jan. 14**	Engineers Club	**J. H. Waxweiler**	PH Stainless Steel
Delaware Valley	**Jan. 21**		**L. H. Nelson**	Statistical Quality Control in a Steel Plant
Detroit	**Jan. 12**	Engineering Society	**D. W. Gates**	Re-Entry Problem and How It Is Being Attacked
Eastern New York	**Jan.**	Edison Club		Aluminum in the Electrical Industry
Fort Wayne	**Jan. 12**	Hobby Ranch House	**E. R. Morgan**	Effect of Yield Point on Properties of Steel
Golden Gate	**Jan. 5**	Spenger's Fish Grotto	**G. H. Kissin**	Finishing of Aluminum
Hartford	**Jan. 13**	Indian Hill Country Club	**F. V. Lenel**	Powdered Metals
Indianapolis	**Jan. 19**	Village Inn	**W. Morrill**	Modern Magnetic Materials
Kansas City	**Jan. 21**	Golden Ox	**R. H. Aborn**	Metallurgy of Ferrous Welding
Lehigh Valley	**Jan. 2**	Hotel Traylor	**C. A. Turner, Jr.**	High-Speed Gas Heating
Louisville	**Jan. 6**	White Cottage Restaurant	**E. E. Stansbury**	Understanding Alloy Effects in Steel
Mahoning Valley	**Jan. 13**		**R. Clark**	T-V Transmissions
Milwaukee	**Jan. 23**	American-Serbian Memorial Hall	**Social**	Winter Carnival
Montreal	**Jan. 5**	Queen's Hotel	**F. Lawton**	Atomic Power and Its Effect on the Metals Industry
Muncie	**Jan. 13**	Students Center	**C. L. Faust**	Metallic Coatings
New Jersey	**Jan. 19**	Essex House	**M. Judkins**	Missiles and Metallurgy
New York	**Jan. 5**	Hotel New Yorker	**E. Pavisic**	Failure Prevention Through Proper Design for Heat Treatment
North Texas	**Jan. 8**		**A. O. Schmidt**	Measurements and Controls for Machinability
Notre Dame	**Jan. 14**	Capri Restaurant	**J. J. Gilman**	Dislocations and Plasticity
Ontario	**Jan. 9**	Beacon Motel	**Gordon Farnham**	
Philadelphia	**Jan. 30**	Engineering Club	**E. R. Weiher**	Adhesive Bonding for the B-58 Airplane
Philadelphia-Jr. Section	**Jan. 7**		**Plant Visit**	Tatnall Measuring Systems Co.
Purdue	**Jan. 20**		**J. H. Frye, Jr.**	Materials Problems in Atomic Energy
Rhode Island	**Jan. 7**		**C. H. Lorig**	National Officers Night
Richmond	**Jan. 14**	Holloway House	**E. Leidheiser, Jr.**	Corrosion of Metals in Contact
Rochester	**Jan. 12**	Manger-Seneca Hotel	**W. M. Baldwin, Jr.**	Hydrogen Embrittlement Trouble Shooting
Rockford	**Jan. 28**	Hotel Faust	**G. Fetherston**	Bright Hardening and Brazing of Stainless Steels
St. Louis	**Jan. 8**	Ruggeri's Restaurant	**Panel**	
Saginaw Valley	**Jan. 13**	High-Life Inn	**F. Green**	Radio-Isotopes in Metallurgical Research
Santa Clara Valley	**Jan.**		**J. E. Berk**	Physical Ceramics
Savannah River	**Jan. 8**		**M. A. Meisner**	Electronic Welding
Southeast Ohio	**Jan. 8**		**E. Davis**	Manufacture of Ferro-Alloys
Springfield	**Jan. 12**	Westinghouse	**W. L. Budge**	Growth of Atomic Power and Its Tooling Problems
Texas	**Jan. 6**	Engineers Club	**E. E. Underwood**	Factors Contributing to the Strength of Alloy Steels
Toledo	**Jan. 8**	Maumee River Yacht Club	**W. Wood**	Springs
Tri-City	**Jan. 13**		**C. H. Lorig**	Selection of Materials in This Changing World
Tulsa	**Jan. 6**	Alvin Hotel	**W. L. Fink**	Aluminum Alloys
Washington	**Jan. 12**	Dodge Hotel	**N. Zlatin**	Developments in Metal Removal
Western Ontario	**Jan. 9**	Windsor		Tool and Die Steels
West Michigan	**Jan. 19**	Schnitzelbank Restaurant	**Panel**	Heat Treating
Wilmington	**Jan. 14**	Sammy Green's Rest'rant	**B. Chalmers**	Solidification of Metals
Worcester	**Jan. 20**	Svea Grill	**H. F. Jahn and E. E. Hall**	Die Design, Steel Selection and Heat Treatment
York	**Jan. 14**		**A. E. Focke**	Aircraft Nuclear Propulsion

Meet Your Chapter Chairman

FORT WAYNE

GEORGE R. HEMMETER was born in Baltimore. His B.S. degree in metallurgical engineering was acquired at Lafayette College, where he was active in varsity football. He joined General Electric Co. after college as metallurgical engineer and is now manager of metallurgical applied research and development. He contributes articles to technical magazines and travels about Indiana giving engineering educational talks to high-school students. He is especially active on two G.E. committees for research and development of soft magnetic steels.

Mr. Hemmeter has been elected to all chapter offices and has served on the executive committee for four years. Activities in community affairs include Exchange Club and Community Concert Series. He and his wife attend St. John's Lutheran Church where he is vice-chairman of the congregation, president of the choir and superintendent of the Sunday school. During the war he was in the Field Artillery for two years and is now in U. S. Army Reserve. He shoots golf in the high 80's and enjoys photography.

MUNCIE

ROBERT H. MCCREERY, a native of Muncie, graduated from Purdue University with a B.S. degree in metallurgical engineering. He later attended radiochemistry summer school at Purdue and took lubricating engineering courses at M.I.T.

He started his career with the International Harvester Co., first as metallurgist, then principal metallurgist and later as general foreman in heat treating. His present position is as metallurgist with Warner Gear Division of the Borg-Warner Corp.

Before taking over as chairman, Mr. McCreery served the chapter as secretary-treasurer and vice-chairman. He is also a 32nd degree Mason and a deacon of the First Presbyterian Church.

He and his wife, the former Helen Brown, have two daughters, Ann, four years, and Sarah, one year old.

SAN FERNANDO VALLEY

RICHARD P. FROMBERG, one of the organizers and a charter member of the San Fernando Chapter, was born and raised in Cleveland, Ohio, and attended Case Institute of Technology, from which he received his Bachelor's, Master's and Doctorate degrees. He continued at Case as instructor and research associate, then served as an engineering officer in the Air Force during World War II.

Previous industrial experience includes foundry, steel mill and industrial research. He is now chief of the Production Development Laboratory, Rocketdyne Division, North American Aviation, Inc. In 1956 Dick was co-recipient of the Henry Marion Howe Award of the A.S.M. for his paper on "Delayed Failure and Hydrogen Embrittlement in Steel".

He makes his home in Granada Hills with his wife, Evelyn, and three children. Hobbies include camping and exploring.

PHILADELPHIA

CHARLES A. TURNER, JR., has been a member of A.S.M. for 24 years. He has a B.S. degree in metallurgical engineering from Lehigh University where he played soccer and basketball.

His first work after college was as openhearth pit foreman for U. S. Steel Corp. Later he was assistant to the superintendent of openhearth at Midvale Steel, and metallurgist at Camden Forge Co. He is now chief metallurgist for Selas Corp. of America.

Mr. Turner has been active in Chapter affairs as director and chairman of the entertainment, educational and program committees, and he was assistant director of the Temple A.S.M. Evening Metallurgical Course.

His daughter, Suzanne, is an actress on stage and TV, and daughter Sandra is a Penn State freshman. He enjoys golf and is interested in amateur dramatics.

ROCKFORD

QUENTIN (Bud) BOWEN has been a life-long resident of Rockford. He attended Ripon College, majoring in chemistry, and is now materials laboratory supervisor for Sundstrand Aviation. Before taking over the leadership of the Chapter he served as vice-chairman. He is also active in A.S.T.M. and the Optical Society.

Bud is an ardent fisherman and is always out there trying to land that big one. In his spare time he enjoys fixing or making new things for his home, a hobby which is enthusiastically endorsed by his wife and three daughters.

NOTRE DAME

WILLIS LEE SCHALLIOL was born in Elkhart. His first industrial experience was on the West Coast with Pacific States Steel Corp., Westinghouse in Sunnyvale, and General Electric in Hanford. During that time he was a member of Golden Gate and charter member of Columbia Basin Chapters. Back home now, he is director of engineering, product and process development, NIBCO, Inc., in Elkhart.

Will has a B.S. degree from Purdue, where he met his wife, Ilyff, and a Ph.D. degree. The family consists of three boys, 14, 9 and 6 years old.

During World War II he was artillery liaison pilot in the European and Pacific areas and was promoted to Captain upon discharge. Recreational interests include skiing, cross-country canoeing and pilot on cross-country hops. Some of his time is given to civic affairs as Boy Scout commissioner and superintendent of Trinity Methodist Chruch School.

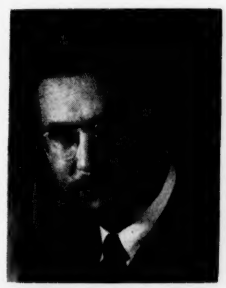
R. H. McCreery

Quentin Bowen

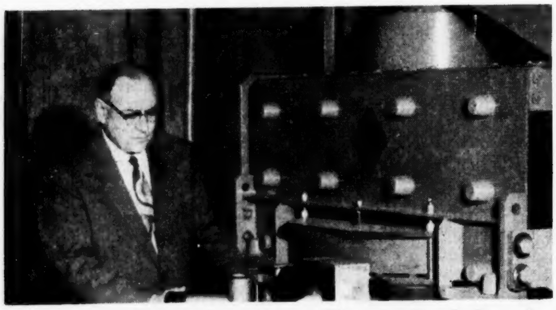
W. L. Schalliol

G. R. Hemmeter

R. P. Fromberg



Stainless Fabrication



William H. Rice, Consultant, Electric Steel Foundry Co., Who Spoke on the "Fabrication of Stainless Steel" at a Meeting in Oregon, Is Shown in Front of a 20-Million Volt Electron-Volt Betatron. The rays of this machine will penetrate 20 in. of steel

Reviews Molybdenum

William Bruckart, Development Engineer at Universal Cyclops Steel Corp., Spoke on "Molybdenum—a New Engineering and Tool Material" at Rockford Last Season. Shown, from left: Mr. Bruckart; Donald A. Campbell, chairman; and Quentin C. Bowen, vice-chairman

Speaker: W. H. Rice
Electric Steel Foundry Co.

William H. Rice, consultant, Electric Steel Foundry Co., spoke on the "Fabrication of Stainless Steel," at a meeting of the **Oregon Chapter.** Dr. Rice gave a general review of stainless steels as to types, uses, fabrication techniques and the operations required to produce finished commercial usable products. Industrial uses of stainless steels are widespread, some of the most important being guided missiles, atomic power, the process industries, mining and smelting, marine and food handling.

Dr. Rice then touched on the properties, uses, heat treatment and the fabrication of the martensitic, ferritic austenitic and precipitation hardening grades of stainless steels. Precipitation hardening alloys have corrosion resistance of the chromium-nickel grades and are also heat treatable because of the precipitation of submicroscopic particles of aluminum, copper, molybdenum or titanium. As an example, the alloy 17-4 PH has a 185,000 ultimate strength and a 150,000 yield strength in its heat treated condition. It is used in aircraft, guided missiles and pump parts, particularly. Heat treatment is accomplished by annealing at 1900° F. and hardening at 900 to 1100° F. The alloy also possesses good weldability characteristics. It is preferable to weld in the annealed condition then to harden or to re-anneal and harden. It can be welded in the hardened condition without a preheat. Lime-coated electrodes of the same composition are recommended. The tungsten inert-gas type of welding may also be used.—**Reported by R. A. Wilson for Oregon.**

A.S.M. created the Annual Teaching Award in Metallurgy, open to teachers of metallurgy in the United States and Canada. Value $2000.

Speaker: William Bruckart
Universal Cyclops Steel Corp.

Sustaining members of the **Rockford Chapter** were honored at a meeting during which William Bruckart, development engineer, Universal Cyclops Steel Corp., spoke on "Molybdenum—a New Engineering and Tool Material". He prefaced his talk with a color movie showing the vacuum melting process for refining and producing molybdenum.

Mr. Bruckart outlined the properties of molybdenum and the advantages of wear resistance plus high specific stiffness to parts made from molybdenum. He pointed out that the annual consumption is now about one million pounds but predicted that by 1960 it will increase to two million pounds. Molybdenum products or machine tool parts can be fabricated by bending, forging, machining, welding, brazing, spinning, floturning, drawing, extruding and cladding.

Mr. Bruckart supplemented his talk with slides illustrating a variety of applications for machine tool parts, electronics and heat treating furnace parts. Looking into the future, he stated that the improvement in properties will be met by advances in alloy design and processing.

In winding up his talk, he described "Infab", a project under way at Universal Cyclops to produce a metal with higher purity through specially designed and precisely controlled processing. — **Reported by G. W. Sandstrom for Rockford.**

ASM Sponsors Fraternity

Alpha Sigma Mu, originally established 25 years ago, has been under American Society for Metals management for about one year. It was the wish of Alpha Sigma Mu national officers and members that A.S.M. assume direction of the metallurgical fraternity so that the Society's national coverage of metallurgical schools might be utilized for the purpose of recruiting new members.

After adopting new constitutional provisions, A.S.M. immediately invited the metallurgical department heads of all U.S. and Canadian schools having degree courses in metallurgy to recommend from among their top students candidates for membership in the fraternity. The response has been most gratifying to the A.S.M. Board of Trustees.

Eighteen of our leading universities have indicated a desire to establish Alpha Sigma Mu Chapters in their schools. These schools have further strengthened their intentions by submitting a total of 97 applications for membership, all of which have been approved by the Board of Trustees.

As a further stimulation of interest in the fraternity, A.S.M. has presented a newly designed gold key to each of those members who were elected prior to June 1, 1958.

Under the new constitution of the fraternity, chapters may be proposed and approved by the Board of Trustees upon the election of a minimum of ten regular members. A regular member is any undergraduate student who is recommended by his department heads.

The Alpha Sigma Mu Constitution provides that there shall be "honorary members" as well as regular student members. Honorary members may be elected by the Board upon their own initiative, or approved by the Board upon recommendation of a school's faculty member. Honorary members shall be those who are in the metallurgical profession and are judged to have achieved high standing in their profession either through academic or industrial activity.

Letters from many schools indicate plans to organize chapters this year. Many faculty members feel that growth will be certain on the basis of the successful beginning the fraternity has already attained.

Stress Principles of Carburizing in Indianapolis Course

Over 100 persons registered for the educational program on "Principles of Carburizing" sponsored by the **Indianapolis Chapter** last season. The subject was divided into four lectures: "Application of Equilibrium Data to Carburizing Atmospheres" was presented by Wilson T. Groves, Dana Corp.; "Diffusion in Carburizing" and "Carburizing Kinetics" were presented in two lectures by Richard Grace, Division of Metallurgical Engineering, Purdue University; and "Flow of Heat" was presented by R. A. Grange, Fundamental Research Laboratories, U. S. Steel Corp.

Mr. Groves discussed equilibrium data as applied to furnace atmospheres to prevent carburizing or decarburizing in hardening, to restore carbon to a specific content in decarburized surfaces, to carburize to a given carbon content throughout the section of a part, and most important, to control surface carbon concentration during gas carburizing for case hardening. Four advantages in controlling furnace atmospheres to produce surface carbon concentrations below saturated austenite were discussed. These were: to obtain maximum case hardenability; to permit the economy of direct quenching work without reheating; to prevent a carbide network at grain boundaries of carburized, slow-cooled and reheated parts; and to permit the use of low hydrocarbon additions which minimize soot deposits in furnace and prolong alloy life.

Mr. Groves explained the reactions that take place between the atmosphere gases and the steel during the carburizing process. Definition and use of equilibrium constants in gaseous equilibria were also discussed. A number of sample problems were worked out to illustrate procedures involved in employing equilibrium constants and gas analyses for calculating the carbon potential at a given temperature. It was pointed out that methane is a very strong carburizing gas and methane a very weak decarburizing gas, and that carbon monoxide is a very weak carburizing gas while carbon dioxide is strongly decarburizing.

A definite relationship exists between the H_2O/H_2 ratio and the CO_2/CO ratio of furnace atmospheres at a given temperature; therefore dew point measurements of the water vapor content can be used to determine the CO_2 content and the carbon potential of the gas mixture for a particular H_2 and CO concentration. At carburizing temperatures dew point measurements are more accurate than direct measurements of the CO_2 content by Orsat. Infrared gas analysis equipment also provides accurate measurement of the gas potential by measuring either the CO_2 or H_2O content.

The meeting was closed by Mr. Groves with the following cautions: (1) Although dew point checks are generally adequate for production control purposes, it must be realized that at the same dew point various carbon concentrations can be obtained, depending upon the hydrogen concentration. It is not the CO_2 or H_2O content alone that determines carbon equilibria but rather the ratio of CO_2/CO or H_2O/H_2. (2) True equilibrium never exists in commercial furnaces due to a constant flow of gases, and with continuous furnaces there may be appreciable discrepancy between actual and calculated figures. (3) Judgement must be used in the application of calculated data.

Dr. Grace began his lecture on "Diffusion in Carburizing" with a statement of Fick's laws on rates of mass flow. He pointed out that the first concepts of the steady and unsteady states originated in the late 1700's with Fourier.

The flow of mass is similar to the flow of heat. In the flow of mass the diffusion coefficient varies with the material composition, and in the flow of heat the thermal conductivity varies with composition also. Theoretical formulas were presented for calculation of diffusion constants, for calculation of carbon gradients under certain boundary conditions and for determining the effect of carbon potential on case depths. In the unsteady state, Dr. Grace explained that the mass distribution may be visualized as:

$$\text{Input} = \text{Accumulation} + \text{Output}$$

Dr. Grace's lecture on "Carburizing Kinetics" dealt with the reaction rate theory and the effect of temperature on carburizing rate. The reaction rate theory comes to use largely from the chemists and is based on the concept that matter is composed partially of small units which have energy greater than the average type of unit in question. This causes collisions which result in special structural configurations of high probability of decomposition into products. Dr. Grace presented equations for calculation of diffusion coefficients. He stated that the value of the diffusion coefficient is a function of temperature and becomes larger as the temperature increases.

Sample problems were solved by Dr. Grace and homework was assigned to the class. The second session was devoted to working the assigned problems and clearing up questions brought up during the practical problem solving period. Dr. Grace provided the class with a number of graphs and charts which simplified the use of various theoretical equations to a practical value.

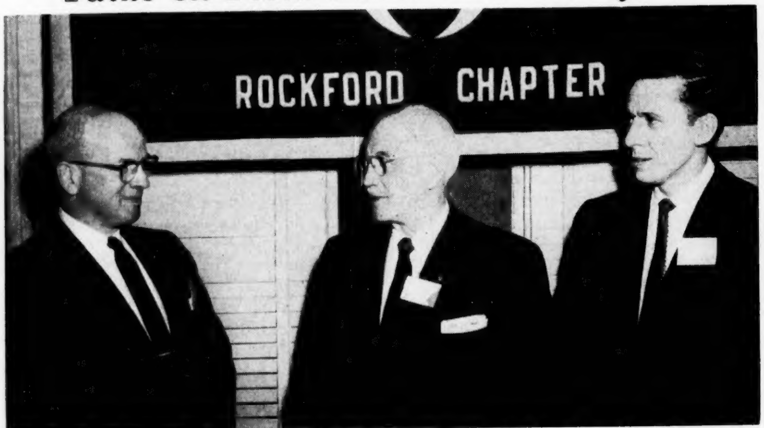
Mr. Grange pointed out some of the fundamental principles involved in the "Flow of Heat". Flow of heat is due to molecular motion, with temperature being a statistical measurement of the molecular velocity. In the measurement of heat we are primarily interested in the amount of heat present and the temperature differential. Conductivity increases in order through gases, liquids, amorphous solids and crystals. Conduction through metals is influenced by many items. Some of the more pertinent are: Mean free path of electrons (effect of solute atoms, lattice strain and thermal agitation), chemical composition (small amount of impurity will greatly decrease conductivity and several impurities are roughly additive) and the microstructure of steel. Conductivity is inversely proportional to absolute temperature and directly proportional to the mean free path of electrons. Heat flow is also retarded by high resistances such as are presented by surface scale and liquid or gas films. Heat flow in the unsteady state is quite complex and the need for simplifying assumptions is necessary. Tables and graphs are helpful to avoid complex calculations and the need for differential analyzers or analog computers. Mr. Grange discussed the application of heat flow analysis to carburizing. Here interest was confined to heat flow in the unsteady state during heating and cooling (quench). The analysis at this time is limited to relatively simple shapes and large pieces. Sample problems were worked out on the calculation of cooling curves and to determine the time required for the center of a piece to reach temperature.

Mr. Grange concluded his talk with the following remarks: (1) There is a need for more thermal data. (2) Application of heat flow data to carburizing practice is limited at present, but there are definite advantages to understanding the fundamentals of heat flow. — **Reported by Hal F. Bramley for Indianapolis.**

Reports on Missiles

W. H. Steurer, Head of Material Research, Army Ballistic Missile Agency, Redstone Arsenal, Is Shown As He Talked on "Guided Missiles—Their Development and Metallurgical Problems" at a Meeting in Detroit

Talks on Field Failures at Rockford



J. D. Graham, International Harvester Co., Spoke on "Field Failures as Influenced by Heat Treatment and Machining" at a Meeting Held by the Rockford Chapter. Shown during the meeting are, from left: Mr. Graham, D. A. Campbell, Chairman; and Q. O. Bowen, Vice-Chairman (1957-1958)

Describes Nuclear Reactor Materials

Harry Pearlman, Chief, Component Development Department, Atomics International, Presented a Talk on "Nuclear Reactor Materials" at a Meeting of the San Diego Chapter. Shown at the meeting, from left, are: Cyril Madden, chairman; G. Schmitt; Dr. Pearlman; and G. D. Cremer

Rockford Honors Past Chairmen

Past Chairmen of the Rockford Chapter Are Shown During a Meeting at Which J. D. Graham, International Harvester Co., Spoke. Present were, from left: R. M. Smith, Ural Gillett and W. Olson, past chairmen; Mr. Graham; D. A. Campbell, 1957-58 chairman; Roy McGraw and G. Nevins, past chairmen; Q. O. Bowen, 1957-58 vice-chairman; and Art Eklund, Jr., past chairman. (Reported by G. W. Sandstrom for Rockford Chapter)

MEN OF METAL

A. A. MILKIE, formerly sales engineer, has been appointed manager of the Chicago district of Pangborn Corp.

EUSTACE LINGLE has been named vice-president in charge of industrial sales and education for Oakite Products, Inc.

CECIL L. KERR has been appointed sales representative in the Pittsburgh district for Selas Corp. of America. He was formerly chief engineer-furnaces, Salem-Brosius, Inc.

JOHN D. MACKENZIE has been elected chairman of the board of American Smelting Co. to fill the vacancy caused by the death of Kenneth C. Brownell.

ARDMORE M. MILLER is now sales manager of West Instrument Corp., Chicago manufacturer of temperature control and recording instruments.

At a recent directors meeting ROBERT ZUFRA, comptroller for National Metal Abrasive Co., was elected assistant treasurer.

JACK K. SCHULTZ is now Philadelphia district manager of Pangborn Corp. and will direct sales activities from headquarters in Jenkintown, Pa.

EDWARD L. PULASKI has been appointed assistant chief works metallurgist at the West Leechburg Works, Allegheny Ludlum Steel Corp.

Washington Schedules Talks

The Washington Chapter is sponsoring a series of six talks on metallurgy, to be held on Thursday from 7 to 9 p.m. at Georgetown University. The talks are intended to show high-school students, metal workers and other people interested in the world of metals where they come from, their uses, properties and how they are formed. The lectures will cover the following subjects:

From Rocks to Metals
Crude Metal to Rough Product
What Makes Metals Useful
The Inner Structure of Metals
Mixed Metals Are Alloys
Today's Research, Tomorrow's Metals

Describes Magnetic Particle and Penetrant Inspection Techniques

Speaker: C. E. Betz
Magnaflux Corp.

C. E. Betz, vice-chairman of the board, Magnaflux Corp., spoke at a meeting of **Albuquerque Chapter** on "New Trends and Applications in Magnetic Particle and Penetrant Methods of Inspection".

Mr. Betz described some of the advantages of these methods of nondestructive inspection such as the fact that only visual recognition of flaws and defects on the surface of the metal is used. The size of the part to be inspected is unlimited, techniques are simple and easy to execute, easily understood and relatively fast, and reliability is unsurpassed. The basic principle in magnetic particle inspection is the distortion of a magnetic field by a defect in the metal, setting up an external flux leak which attracts and holds magnetic particles. Half-wave rectified alternating current is most effective for setting up the magnetic fields. Magnetic particles are applied as dry powder or from a liquid, and can be obtained in different colors and particle sizes. It is necessary to control the direction of the magnetization so as to intercept the defects.

In one of the new methods of inspection for unknown defects, the magnetic forces can be set up alternately in two directions very rapidly in one inspection operation. Another new process utilizes transient currents to produce circular fields in circular objects. This process is useful for bearing races and requires no direct electrical contact to the race. A new fluorescent magnetic particle formulation provides a better bond between the fluorescent material and the magnetic particle, makes bath maintenance easier and allows speedier inspection. This material is being used on compressor blades, seam-welded pipe and round and square billets.

The penetrant method of inspection effective on nonferrous materials is simpler than the magnetic particle method but will show only discontinuities open to the surface. In this procedure a liquid is applied and allowed to penetrate open cracks. The excess is removed, and after a developing powder draws the penetrant from the cracks to the surface, a white or fluorescent light is used to locate the defects. The main requirements are that the cracks must be open, the penetrant drawn out must be visible, and the technique and materials must be carefully controlled. Dye penetrant requires no special lights which the fluorescent penetrant does, but the latter is more sensitive. Improvements in this process, such as most effective materials to draw the dye out of the cracks, several times more brilliant dyes, more intense black light and improved equipment, have resulted in a speedier process and the ability to detect smaller defects.

Mr. Betz summarized his talk with comments on the trend in nondestructive inspection, such as the increasing demand for improved sensitivity to insure flaw-free parts. More speed is required to get higher production. The need is becoming greater for dependability and reproducibility of results. It is desired that there be more elimination of the human factors to improve dependabilty. There is also a need for development of standards of acceptance or rejection so that the judgment of the inspector is not necessary.—**Reported by G. J. Hof for Albuquerque.**

Discusses "Toolsteel Breakthrough"

Past President George A. Roberts, Vice-President, Technology, Vanadium Alloys Steel Co., Talked on "Toolsteel Breakthrough" at a Meeting of the San Diego Chapter. Shown at the speaker's table are, from left: Cyril Madden, 1958-59 chairman; Dr. Roberts; G. D. Cremer, 1957-58 chairman; S. Carpenter, 1958-59 vice-chairman; R. Stemmler, president, Vanadium-Pacific Steel Co.; James Woodward, student affairs chairman; and George Schmitt, 1957-58 chairman of the chapter's reception committee

Southern Tier Hears Talk On Atmosphere Controls

Speaker: R. F. Novy
Lindberg Engineering Co.

R. F. Novy, chief research engineer, Lindberg Engineering Co., spoke on "Atmosphere Control Instrumentation" at a meeting of the **Southern Tier Chapter.**

Mr. Novy discussed atmosphere control and automation in heat treating. The largest single potential of atmosphere control is restoration of carbon to metal products which have a deficiency of carbon due to manufacturing methods.

The basic requirements for successful atmosphere control processes include: a basic carrier gas; gas atmosphere control equipment, the gas generator; furnace equipment; and the surface condition of parts or material being treated.

He then discussed gas chemistry as related to gas-solid reactions encountered with steel. The basic gases which react readily with steel are nitrogen, oxygen, carbon dioxide, water vapor, carbon monoxide and methane. The reactions of these gases with iron and iron carbide were shown in a series of slides. It was pointed out that the basic reason for protective atmospheres is to prevent some of the gas-solid reactions and to catalyze other of these reactions.

A carrier gas is selected so its effect on a single constituent in the steel can be controlled and measured. The most prominent protective atmosphere is an endothermic gas, usually generated in commercial equipment. This is a mixture of hydrogen, carbon monoxide, carbon dioxide and methane. The most easily controlled property of this gas is the dew point.

Other elements in the gas, such as carbon dioxide and methane, may be controlled rather than the dew point by use of the infra-red absorption unit. The endothermic gas generator is an air-gas compressor in which the gas is specially heated in the presence of a catalyst and then cooled. This gas as delivered to the furnace equipment contains a small amount of water vapor.

The furnace equipment required consists of a gas-tight furnace to prevent air infiltration, a fan-equipped furnace for circulation and agitation of the atmosphere, and a furnace designed to give uniform temperature throughout. — **Reported by W. J. Collins for Southern Tier.**

Defines Project Vanguard for Students

M. T. Ruth, Manufacturing Manager on "Project Vanguard" Spoke at the Temple Night Meeting of Philadelphia Chapter, Held at Temple University. Shown are a group of high-school students viewing the Vanguard exhibit

Speaker: M. T. Ruth
Martin Co.

"Project Vanguard-Metallurgy and Space Flight" was the subject discussed by Melvin T. Ruth, manufacturing manager on Project Vanguard, at a meeting of the **Philadelphia Chapter** held at Temple University.

This first meeting of the new season, which is traditionally held for high-school students in the area, was attended by an unusually large group of students, who also heard a discussion of the metallurgy course which is given at Temple, sponsored by the Philadelphia Chapter.

Mr. Ruth explained that the Martin Co. is the prime contractor for the three-stage rocket to launch the satellite and he discussed some of the problems in its design and construction. The rocket is as tall as a seven-story building, and with fuel, its weight is more than 11 tons.

Materials for the rocket had to be selected in such a way as to combine maximum strength and heat resistance at critical points with minimum over-all weight. The principal metals used are aluminum, magnesium, stainless steel, titanium and a magnesium-thorium alloy.

The nose tip is made of titanium to provide a good heat sink for the high temperatures caused by aerodynamic heating, and the remainder of the nose cone is made from an asbestos phenolic which is light and retains its strength at elevated temperatures.

A magnesium-thorium alloy is used from the base of the nose cone to the top of the second-stage tankage because of its lightness and ability to retain strength at elevated temperatures. The second-stage tankage is made of 410 stainless steel which is resistant to corrosion, can be heat treated and has good strength properties.

The transition section and aft skirt are made from magnesium alloys because of their light weight. The first-stage tankage is made of 61S aluminum alloy because the alloy is weldable and has good strength for buckling loads. The remainder of the vehicle below the tankage is constructed from magnesium because of its lightness.

Mr. Ruth illustrated his talk with slides showing the internal details of the three-stage rocket, the main steps in its launching and the trajectory it will follow. He showed actual film of previous firings of the Vanguard.—**Reported by N. J. Petrella for Philadelphia.**

Precipitation Hardening Steels Subject at Texas

Speaker: George E. Linnert
Armco Steel Corp.

George E. Linnert, supervising research welding metallurgist, Armco Steel Corp., gave a talk on the development, characteristics and uses of "Precipitation Hardening Stainless Steels" before the **Texas Chapter.**

The requirements for a high-strength steel with better corrosion resistance than the "400" series stainless steels and which could be hardened by heat treatment led to the development of such steels as 17-4 PH and 17-7 PH. These grades represent a precipitation hardened martensitic structure in the final heat treated condition. Shortly afterward, the need arose for a nonmagnetic precipitation hardening stainless steel. This need was filled by the 17-10 PH grade. Precipitation hardening is accomplished in this grade through the combined efforts of carbon and phosphorus when heated in the temperature range from 1200 to 1300° F.

Hardness in the neighborhood of 40 to 45 Rockwell is easily obtained with the martensitic precipitation hardened stainless steels, such as 17-4 PH, and the tensile strength of the material is commensurate with its hardness. The nonmagnetic 17-10 PH material does not get quite as hard, increasing from Rockwell B 85 to Rockwell C 30-33 after treatment.

Mr. Linnert reviewed the transformation and formation of martensite and explained the basic principles which control the ability of the material to harden by precipitation. Precipitation hardening was shown to be dependent on the crystallographic structure of the alloy and the presence of special elements such as copper or aluminum in the chemical composition.

Through the use of slides, Mr. Linnert described the various microstructures associated with each of the various precipitation hardening stainless steels, and pointed out where delta ferrite was present in certain grades and the function of this constituent.

Mr. Linnert carried through to the fabrication of these relatively new steels, emphasizing the fact that precipitation hardening stainless steels are not difficult to handle in fabricating, but are different.—**Reported by Charles Hall for Texas.**

Metallographic Atlas Under Preparation

A world-wide "General Ferrous Metallographic Atlas" is under preparation by the European Coal and Steel Community, and specialists throughout the world are invited to contribute micrographs.

The volume will be divided into three parts: A—Fundamental Metallography, B—Microstructure of Carbon and Alloy Steels, and C—Cast Irons.

A subcommittee has been appointed by the European Coal and Steel Community to organize and implement the work of gathering the material and publishing the Atlas. This subcommittee includes representatives of important metallographic and metallurgical societies and institutes in Italy, Belgium, Holland, France and Germany. A.S.M. has been unofficially named as American representative of the project and will handle distribution of the Atlas in this country.

Each metallograph accepted for publication will carry the name of the metallographer or contributer and his laboratory or company connection. American metallograpers who would like to contribute items from their work to this international undertaking should address the American Society for Metals, attention of E. E. Thum, 7301 Euclid Ave., Cleveland 3.

Reports on Visit to Russia at Buffalo

Speaker: John Chipman
Massachusetts Institute of Technology

Much is read in the nontechnical press of current conditions in Russia. Glowing statements of social and technological progress are the frequent theme of such articles. But how does a technical man evaluate these conditions after a visit?

The **Buffalo Chapter** heard A.S.M. past president John Chipman, Massachusetts Institute of Technology, report on his 1957 visit to Russia to attend a meeting on steelmaking. Hundreds of papers were given at the meeting, each speaker being allotted 20 min. The over-all quality of the work reported was, in his opinion, equal to that of comparable research work conducted here.

During his stay he was permitted free access to all of the country, including research laboratories and similar technical areas. Russian research laboratories are, in general, larger and more extensive than those in the U. S., due to the fact that such activities are Government sponsored and are divided on a scientific rather than a company basis. The laboratories are crowded but this does not detract from their over-all efficiency. They are well equipped and staffed and generally work on self-initiated projects.

With respect to metallurgical education, the system is one of specialization rather than generalization. A prospective soviet metallurgist begins to specialize at about the age of 17. Following a high-school education which includes three to four years of chemistry, physics and mathematics, he continues with three years of extensive metallurgical study which would be approximately equivalent to that offered during the first three years by M.I.T. Following his third year of study the metallurgy student specializes in a specific phase of technology. Following his formal education he is given shop training which supplements his theoretical knowledge and finally, before being awarded his degree, he must pass an oral examination. If the candidate is successful he returns (without choice) to the specialty for which he was trained. This same procedure is followed in all technical education. Through such specialized training, Dr. Chipman feels the men entering industry can contribute readily to the specific technology for which they were trained.

Dr. Chipman visited four steel plants and reported that they are well run and use modern equipment. One of the smaller plants is run as a Government pilot plant where advanced technology in introduced into the production stage prior to acceptance by industry. According to Dr. Chipman, the finest accomplishment of the soviet steel industry is their blast furnace control, in which they employ complete ore preparation, high top pressure, oxygen and humidity controls. Using such controls the yield of iron is extremely efficient and of high quality.

Socially speaking, the facilities offered the Russians are substandard to those offered the American people in that consumers goods are priced exceedingly high in relation to income. He feels that the technical man has a better than average income, more privileges, and is satisfied, in general, with his working conditions and social status.—**Reported by G. F. Kappelt for Buffalo.**

Pipeline Problems Are Explained at Ottawa

Speaker: H. Maurice Banta
Battelle Memorial Institute

H. Maurice Banta, technical consultant, Battelle Memorial Institute, spoke on "Metallurgical Problems in Gas Transmission Lines" at **Ottawa Valley Chapter.**

The speaker's talk was mainly concerned with large diameter pipe, 20 to 40 in., commonly being used for present-day transmission. The trend in recent times to larger diameters, thinner walls, pipes and higher transmission pressures has necessitated the solving of certain inherent metallurgical problems.

A brief summary of the common manufacturing procedures was given (skelp to U press to O press followed by longitudinal welding and 1½% cold expansion in closed dies). The latter operation serves to test the weld, round up the pipe and increase the yield.

Working pressures are normally designed at 72% of the yield, allowing 28% for other stresses, such as accumulated stresses resulting from temperature changes, soil pressures, bending and out-of-roundness.

The material used is semikilled steel with maximums of carbon and manganese in the order of 0.30% and 1.25%, respectively, and a yield minimum of 52,000 psi. Higher contents of these elements contribute to welding difficulties. Use of killed steel cannot be economically justified.

Failures were divided into two principal categories, those due to field handling practices and those due to faulty manufacturing of the pipe. These categories were divided roughly into the ratio of 2/3 and 1/3 of the total number. Failures attributed to manufacturing are, in turn, mainly attributable to welding practices and those in the field to rough handling which has resulted in gouges or severe notching. With few exceptions, the failures have occurred on testing and not in service.

The most serious type of failure is the brittle type which occurs with explosive violence. They originate at sharp notches and have been known to progress for several thousand feet along the pipe line in a fraction of a second. Graphs were shown which demonstrated the great energy involved and the greater tendency for this type of failure as the pipe becomes larger. Tests carried out at Battelle to deliberately initiate this type of failure have shown that stresses in excess of the yield strength must be present at the base of a notch.

Some pertinent trends and opinions based on industrial experience and research at Battelle were summarized briefly in closing. These show that higher strength pipe may be anticipated with new welding developments; that liquid pressure should come into greater use for proof testing since cracks do not propagate as with gas pressures; that proof tests up to the yield will be more commonly used than the 90% now required since it has been shown that the yield can be exceeded safely if sharp notches are not present; greater precautions will be taken with loading methods since it has been calculated at Battelle that certain conditions of loading can cause the fatigue stress to be exceeded in large pipe during transit.—**Reported by R. D. McDonald for Ottawa Valley.**

Illinois Student Gets Scholarship

Darryl L. Albright (Left), Senior in the University of Illinois College of Engineering, Is Shown Receiving the American Society for Metals Scholarship Award From Raymond H. Hays, Vice-Chairman of the Peoria Chapter

A.S.M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared at the Center for Documentation and Communication Research. Western Reserve University, Cleveland. With the Cooperation of the John Crerar Library, Chicago.

A General Metallurgy

624-A.* Nickel, Including High-Nickel Alloys. Albert J. Marron, J. J. Moran, Jr., L. M. Petryck and M. D. Bellware. *Industrial and Engineering Chemistry,* v. 50, Sept. 1958, Pt. 2, p. 1460-1469.

Review of 1957-1958 literature. Metallurgy, application, welding and fabrication. 175 ref.
(A-general, 11-54; Ni)

625-A. Properties and Handling Practices for Magnesium: Literature Survey. M. Beederman, G. A. Bennett, L. Burris, I. G. Dillon, I. O. Winsch, M. W. Nathans, E. Greenberg and J. Wolkoff. Argonne National Laboratory, *U. S. Atomic Energy Commission ANL-5749,* Mar. 1958, 132 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $2.75.

Cost and availability of various grades of high-purity Mg; safety considerations in handling Mg; materials of construction and industrial handling procedures; methods of production and distillation of Mg; physical and thermodynamic properties; survey of binary and ternary alloys. 200 ref.
(A-general; Mg)

626-A.* The Application of the Discoveries of Nuclear Physics to the Metallurgical Industry of the USSR. Paper from "Advances in Steel Technology in 1956", United Nations, 1958, p. 22-48.

Main directions in which the use of radioisotopes and nuclear radiation have been developed are in metallography and physical metallurgy; in the study and control of metallurgical processes such as production of pig iron and steel; and in gamma-radiography for detection of defects and control of technological processes. 89 ref.
(A-general, 1-59; 14-63)

627-A.* (German.) **New Knowledge in the Field of Cast Iron Metallurgy.** W. Herrmann. *Giesserei-Praxis,* no. 16, Aug. 25, 1958, p. 309-310.

Effect of interaction of Fe, C and Si; effect of P and O. Effects of alloying agents on mechanical properties of gray iron. Heat resistant, stress resistant, corrosion resistant and wear resistant cast iron.
(A-general, Q-general, 2-60; CI)

628-A.* Work Sampling—a Tool for Basic Steel Management. A. G. Holzman. *Blast Furnace and Steel Plant,* v. 46, Oct. 1958, p. 1070-1074.

Work sampling, also known as ratio-delay study or occurrence study, can be effectively used by basic steel management to obtain reliable information on irregular, noncyclic activities and delays. Computers can be programmed to perform calculations after observations are made. Method was applied to study of three openhearth furnaces during 14 shifts and results compared very well with those of continuous time study over same period. (A5d, D2; ST)

629-A.* High Strength Steel for Aircraft Applications. A. J. Lena and E. E. Reynolds. *Blast Furnace and Steel Plant,* v. 46, Oct. 1958, p. 1081-1088.

Including precipitation hardening stainless steels, martensitic hardening stainless steels, cold rolled austenitic stainless steels, hot die tool-steels and superalloys. New methods of evaluation and manufacture. 4 ref. (A-general, T24, 17-57; SS, AY, SGB-a)

630-A.* Lead as a Corrosion Resistant Material. *Corrosion Prevention and Control,* v. 5, Sept. 1958, p. 51-52, 54-57.

Extraction and refining techniques; properties and uses of Pb and Pb alloys; effect of alloying additions on mechanical properties; manufactured forms.
(A-general, R-general, 17-57; Pb, SGA-g)

631-A.* 200-Series Stainless Steels. *Iron Age,* v. 182, Oct. 16, 1958, p. 199-200.

Properties and processes, short-time high-temperature strength, ductility, corrosion resistance, stress cracking, stress-rupture and annealing.
(A-general, Q-general, J23; SS)

632-A.* Metallurgical Design Considerations for Precipitation-Hardening Steels Up to 1200° F. F. K. Lampson. *SAE Transactions,* v. 66, 1958, p. 565-573.

Five new alloys—17-7PH, 17-4PH, AM 350, AM 355 and A-286—designed for use up to 1200° F., although long exposure is not feasible above 800° F. Chemistry of each alloy and effect of heat treatment. Although the new alloys are weldable, the metallurgical characteristics must be realized to assure consistent crack-free weldments.
(A-general, 17-51; SS)

The subject coding at the end of the annotations refers to the ASM-SLA Metallurgical Literature Classification. International (Second) Edition, now available from A.S.M., 7301 Euclid Ave., Cleveland 3, Ohio.

633-A.* Special Alloys Boost Metalworking's Future. *Steel,* v. 143, Oct. 20, 1958, p. 158-164.

Properties and applications of leaded steels, vacuum melted metals, spring alloys, cast high alloys, Cu alloys, high-temperature alloys, high-strength steels and super-strength steels.
(A-general, Q-general, 17-57; ST, Cu, SS, AY, SGA-h)

634-A.* (French.) **Effects of Intense Radiation From Nuclear Reactors on Materials.** James C. Wilson. *Energie Nucleaire,* v. 2, July-Sept. 1958, p. 207-212.

Examples of known modifications of structure and behavior of irradiated metals; both temporary and long-term changes can occur. Classic testing methods are rejected as invalid for irradiated materials, which undergo such transformations that their properties and the correlations among these properties become those of new and unknown materials. It is suggested that studies of irradiated materials be made at source of radiation (i.e., in the reactor) and during same. 18 ref.
(A-general, 2-67)

635-A.* (French.) **Lithium and Its Use.** A. Roos. *Metallurgie et la Construction Mecanique,* v. 90, Sept. 1958, p. 657-663.

Ores and production; Li in the metallurgical industry; Li-Al-Mg alloys. Miscellaneous uses. Vitrifying effect. (A-general; Li)

636-A.* (German.) **Meehanite Cast Iron and Its Significance.** H. Kluge. *Giesserei-Praxis,* v. 18, Sept. 25, 1958, p. 361-365.

Properties: tensile strength, density, hardness, machinability, hardenability, pressure tightness. Major types: general use, heat resistant, wear resistant, corrosion resistant. Tables of mechanical, physical and chemical properties; applications.
(A-general, Q-general, 17-57; CI-q)

637-A.* (German.) **Production, Properties and Applications of Super-Pure Aluminum (99.999%).** Hans Schmitt and Walter Koch. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 11, Sept. 1958, p. 427-432.

Production of high-purity Al; disadvantages of graphite electrodes in refining cells; development of cells with metallic terminals. Colorimetric method for determining Si, Cu and Fe in pure Al. Strength, conductivity, corrosion resistance.
(A-general, C23, Q-general; Al-a)

638-A.* (Russian.) **Major Iron Ore Deposits in the USSR.** I. S. Shapiro. *Metallurg,* v. 3, Sept. 1958, p. 1-3.

Vast new iron ore deposits uncovered. Resources are estimated at 37 billion tons, or 40% of world

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

resources. Only 15% of ore deposits require no enrichment and these are found in the Krivoirog basin. Their iron content is from 55 to 75%. Deposits in Eastern Siberia have 40% Fe. (A4n; Fe)

639-A. (Rumanian.) **Accomplishments and Prospects of the Mining and Metallurgical Industries of the Rumanian People's Republic.** St. Mantea and Gh. Vanci. *Studii si Cercetari de Metalurgie,* v. 1, Jan-June 1956, p. 11-20.

Impressive development of Rumanian industry since second world war, especially during the first 5-year plan, was made possible by development of mining and metallurgy basic industries, by enlargement of the basis of raw materials, by systematic inventory of mineral reserves increased extraction. Production of 1,000,000 tons of briquettes is expected by 1960. Enlargement of plants, development of nuclear industry. (A-general)

640-A. Survey of the Metal Industry. Clement Blazey. *Australasian Engineer,* v. 50, July 7, 1958, p. 48-56.

Technical and economic aspects of metallurgy. 31 ref. (A-general)

641-A. (Russian.) **Origins and First Stages in Development of Blast Furnace Production.** N. I. Krasavtsev. *Metallurg,* v. 3, Aug. 1958, p. 35-37.

Evolution of ironmaking from ancient Chinese practice to 19th Century European developments. (A2, D1; Fe)

642-A. (Slovakian.) **Accident Prevention in Welding.** Pavel Hrbal. *Zvaranie,* v. 7, Aug. 1958, p. 249-251.

(A7p, K-general)

643-A.* Liquefied Petroleum Gases and Their Uses in Metallurgy. C. F. Port. *Metal Treatment and Drop Forging,* v. 25, Sept. 1958, p. 363-368.

Properties and specifications of commercial butane and propane; handling and metallurgical applications. (A-general; RM-m)

644-A.* Zirconium. F. G. Cox. *Welding and Metal Fabrication,* v. 26, Oct. 1958, p. 358-365.

Possibilities as a corrosion resistant material for general use in the chemical industry by virtue of its excellent resistance to alkalies—better than that of Ta, Ti and 18-8 stainless steel—and to most acids. For atomic energy purposes, Zr is particularly useful in water-cooled reactors. General properties, working characteristics, machining, welding and corrosion resistance. 14 ref. (A-general; Zr)

645-A. Lead and Its Alloys. Edward J. Mullarkey. *Industrial and Engineering Chemistry,* v. 50, Sept. 1958, Pt. 2, p. 1449-1454.

New alloys, corrosion applications in electronics, nuclear reactors, leaded steels. 100 ref. (A-general, 17-57; Pb-b)

646-A. Less Common Metals. E. M. Sherwood. *Industrial and Engineering Chemistry,* v. 50, Sept. 1958, Pt. 2, p. 1455-1459.

Literature review on zirconium, hafnium, molybdenum, columbium, tantalum, chromium and rhenium. 160 ref. (A-general, 10-54; Cb, Cr, Hf, Mo, Re, Ta, Zr)

647-A. Stainless Steels and Other Ferrous Alloys. W. A. Luce. *Industrial and Engineering Chemistry,* v. 50, Sept. 1958, Pt. 2, p. 1482-1488.

Properties of stainless steel, high-Si iron and Fe-Ni alloys. 135 ref. (A-general, Q-general, 11-54; SS, Fe, Ni, Si)

648-A. Titanium. Howard B. Bomberger. *Industrial and Engineering Chemistry,* v. 50, Sept. 1958, Pt. 2, p. 1493-1495.

Literature review covering production, fabrication, properties and applications. 39 ref. (A-general; Ti)

649-A. (German.) **Depreciation in Foundries.** H. Herrmann. *Giesserei Praxis,* no. 15, Aug. 10, 1958, p. 298-299.

(A4, A5, W19)

650-A. (Russian.) **Application of Radioactive Isotopes to Ferrous Metallurgy.** L. A. Shvartsman. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 915-921.

Use in study of nonmetallic inclusions, particularly during melting and pouring of metals. Value of radioactive calcium isotopes as indicators. Application to study process of steel deoxidation and hydrodynamics of slag formation. (A-general, 1-59; ST, RM-q)

651-A.* Sources of Columbium. Kenneth B. Highbie. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 10-15.

Nature of ore deposits and reserves of columbium-bearing minerals in Africa, Canada, Europe, South America and U. S. 16 ref. (A11a; Cb)

652-A. Urea From Steel Mill By-Products. *Canadian Chemical Processing,* v. 42, Aug. 1958, p. 51-53.

Cyanamid of Canada will take nitrogen, hydrogen and carbon dioxide from Dofasco's steel operations to make ammonia and urea. (A11c)

653-A. Iron Ore and Other Raw Material Sources for a Primary Iron and Steel Industry in Western Canada. T. H. Janes. *Canadian Mining and Metallurgical Bulletin,* v. 51, Sept. 1958, p. 564-573. (Also in *Transactions,* v. 51, 1958, p. 314-323.)

20 ref. (A11a; Fe, RM-n)

654-A. Silicon Steels for Cores. *Iron Age,* v. 182, Oct. 16, 1958, p. 188, 189.

(A-general, P15g, P16s; ST, Si, SGA-n)

655-A. Planned Maintenance Techniques for a Hot Strip Mill. James R. Kennedy. *Iron and Steel Engineer,* v. 35, Oct. 1958, p. 139-144.

Summary of system to replace worn parts before failure; inspect at scheduled intervals, enlist cooperation of workers. (A5, 18-71, F23, W23c; ST, 4-53)

656-A. Human Temperature Regulation and the Steel Industry. R. F. Hellon. *Iron and Steel Institute, Journal,* v. 190, Oct. 1958, p. 197-200.

16 ref. (A7q, D-general; ST)

657-A. Condensed Review of Some Recently Developed Materials. *Machinery,* v. 65, Oct. 1958, p. 131-141.

List of new materials with trade name, properties, applications, manufacturer and address. (A-general; 11-69)

658-A. Titanium Castings . . . Is the Time Ripe? John H. Garret and Franklin P. Huddle. *Modern Castings,* v. 34, Aug. 1958, p. 18-21.

(A4p, Ti, 5-60, 17-57)

659-A. Estimating Electroplating Costs. Frank Spicer. *Product Finishing,* v. 11, Oct. 1958, p. 64-69.

A resume of a meeting by the National Association of Metal Finishers of America. Pricing the plating of a bracket, channel of rolled steel, brass tube. (A4s, L17; ST, Cu-n, 17-53)

660-A. Effects of Uranium Ore Refinery Wastes on Receiving Waters. E. C. Tsivoglou, A. F. Bartsch, D. E. Rushing and D. A. Holaday. *Sewage and Industrial Wastes,* v. 30, Aug. 1958, p. 1012-1027.

12 ref. (A8c; U)

661-A. Metal Selector, 1958 Edition. *Steel,* v. 143, Oct. 20, 1958, p. 165-180.

Tables of chemical composition ranges and limits, properties and typical uses, corrosion and heat resistance of leaded steels, vacuum melted metals, spring alloys, cast high alloys, Cu alloys, high-temperature alloys, high-strength steels and super-strength steels. (A-general, 17-57; ST, Cu-b)

662-A. Titanium. John W. Stamper. *U. S. Bureau of Mines Minerals Yearbook, Preprint,* 1957, 18 p.

Review of production, stockpiles, technology. 45 ref. (A4; Ti)

663-A. (Dutch.) **Uses of Nickel-Rich Alloys.** C. Vollers. *Metalen,* v. 13, Aug. 15, 1958, p. 280-281.

(A-general, 17-57; Ni-b)

664-A. (French.) **Niobium and Tantalum, Metals of the Future.** *Echo des Mines et de la Metallurgie,* no. 3519, Aug. 1958, p. 495-497.

(A-general; Cb, Ta)

665-A. (German.) **Regeneration of Sulphuric Acid in Wire Pickling.** Werner Mallach. *Draht,* v. 9, Sept. 1958, p. 335-342.

Mathematical considerations for a simulated system where the regenerating plant is interpolated in the acid circuit. Chemical reactions occurring in pickling; change in density of water-dissolved H_2SO_4 in service; its thermal behavior; solubility of iron sulphate. In the regeneration process, $FeSO_4$ is precipitated by cooling. (A8b, L12g; 4-61)

666-A. (German.) **Air Contamination and Dust Removal in a Foundry.** Antonio Riggi. *Giesserei,* v. 45, Sept. 11, 1958, p. 575-582.

(A8a, W19)

667-A. (German.) **Use of Blast Furnace Gas in the Synthesis of Hydrocarbons.** Herbert Kolbel. *Stahl und Eisen,* v. 78, Aug. 21, 1958, p. 1165-1169.

Synthesis of hydrocarbons from blast furnace gas and steam. (A11e, A8a; RM-m39)

668-A. (German.) **Reduction of Iron in an Ancient Bloomery.** Eberhard Schurmann. *Stahl und Eisen,* v. 78, Sept. 18, 1958, p. 1297-1308.

Research on the reduction process of the old-time bloomery hearths, based on analysis of slag found. (A2, D-general; Fe, RM-q)

669-A.* The U. S. Position as to Resources for the High-Temperature Metals. Richard M. Foose. *SRI Journal,* v. 2, no. 2, 1958, p. 56-63.

The principal candidates for high-temperature service either alone or as alloys are Cb, Ta, Mo, W and Cr. Only with Mo is the United States in a comfortable position. Location of major deposits of each metal; applications. (A-general; SGA-h, Cb, Ta, Mo, W, Cr)

670-A.* (German.) **Precious Metals in Research and Industry.** H. Wolf.

Metall, v. 12, July 1958, p. 585-593.

Extensive literature survey for last six years on basic chemistry, application of precious metals as tracers and in diffusion studies. Cohesion and vapor pressures as well as electrical properties have enlarged the field considerably. A great number of binary systems with Ag and Pt investigated. Metals like Os, In, Ru, Rh and Pd are advancing and have some advantages over Au, Ag and Pt. 276 ref. (A-general; EG-c31)

671-A.* Removal of Corrosion Products From High Temperature, High Purity Water Systems With an Axial Bed Filter. R. E. Larson and S. L. Williams. *Corrosion,* v. 14, Sept. 1958, p. 44-48.

Concentration of corrosion products and other impurities which produce radionuclides must be maintained at a minimum in the primary coolant systems of nuclear power plants. While resin exchangers remove corrosion products and their radioactive nuclides, high unit cost of resin and the need for large heat exchange unit makes high-temperature purification with low-cost media attractive. Axial bed filter charged with low-cost magnetic iron oxide shows thermal stability and is highly effective. 5 ref. (A8d, W11p, R10g)

672-A. Design and Operation of Hanford's Plutonium Metallurgy Facilities. O. J. Wick and I. D. Thomas. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1903, 1958, 11 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Complete containment within glove boxes is adhered to throughout the entire fabrication process. (A7r, 17-51; Pu)

673-A.* (French.) **Study of Foundry Production Planning.** Rene Sauquet. *Fonderie,* no. 150, July 1958, p. 305-318.

Twenty-eight habitually encountered weaknesses in both office and shop; corrective measures. Considerations are customer satisfaction with delivery, price and quality and efficient plant operation permitting fair profit to be realized on each order. Charts and graphs show suggested handling of orders from moment of receipt until delivery of product. (A5, E-general)

674-A.* (French.) **Accident Prevention in Foundries.** J. Leonard. *Fonderie Belge,* v. 28, Aug. 1958, p. 249-250.

Introduction to statistical study to be presented in eight installments; figures on accident frequency in Belgian foundries and safety standing as compared to other industries. (A7p, E-general)

675-A.* (Italian.) **Manganese. Pt. 2.** Andrea Ciaccio and Mario L. Savarese. *Industria Mineraria,* v. 9, 2nd Series, June 1958, p. 343-351.

Role of Mn in steelmaking; production of carburized ferromanganese in blast furnaces and electric furnaces; methods of producing low carbon ferromanganese and silicomanganese. Processes used in manufacture of commercially pure Mn. Cost factors in production of various types of ferro-alloys containing Mn and of metallic Mn. Figures on Italian production, importation and export of Mn ores and materials from 1942 through 1957. 19 ref.
(A-general; Mn, AD-n31)

676-A.* (Italian.) **Plastic Working of Sheet Steel. Pt. 1. The Material.** Riccardo Levi. *Rivista di Meccanica,* v. 9, June 21, 1958, p. 51-57.

Metallurgy of steel for presswork applications, rimmed, killed and semikilled steels; normalizing and annealing of sheet product for subsequent plastic working; finish rolling; aging; storing and handling of stock; flatness; dimensional tolerances. (To be continued.)
(A-general, F23, J23; ST, 4-53)

677-A.* Columbium (Niobium) and Tantalum. Pt. 1. General Metallurgy, Occurrences and Uses. D. R. Williamson and Lorraine Burgin. *Colorado School of Mines Mineral Industries Bulletin,* v. 1, Sept. 1958, 12 p.

Composition and distribution of rocks containing Cb and Ta minerals. Concentration methods, processors, prices, metal production and refining, physical properties and uses. 114 ref.
(A11a, A4, C-general; 17-57, Cb, Ta)

678-A.* Two New 1800° F. Alloys for Cast Turbine Blades: Nicrotung, J. T. Brown. **DCM Alloy.** J. E. Wilson. *Metal Progress,* v. 79, Nov. 1958, p. 83-87.

Both are nickel-base alloys and contain about 4% Al and 3½ to 4% Ti; Nicrotung contains 12% Cr, 10% Co, 8% W, plus B and Zr; DCM has 14 to 16% Cr, about 5% each of Mo and Fe, plus B and Cu. Both are designed for high stress-rupture strength. (A-general, Q-general, 2-62, T7h, 17057; Ni-b, SGA-h)

679-A.* (English.) **Spheroidal Graphite Cast Iron.** *Metalen,* v. 13, May 20, 1958, p. 92-97.

Structural characteristics, mechanical properties, physical properties, resistance to wear, heat and corrosion of spheroidal graphite cast irons in the as-cast or annealed condition. Properties and production characteristics compared with flake graphite irons. (A-general; CI-r)

680-A. Safe Handling of Sodium in Titanium Production. Ted F. Meinhold and Jack Winterhaler. *Chemical Processing,* v. 21, Sept. 1958, p. 76-80.
(A7, C1g; Ti, Na)

681-A. Disposal of Radioactive Wastes from the Uranium Ore Refining Industry. E. C. Tsivoglou. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/2359, 1958, 12 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Course of radioactive materials, particularly radium, through the refining process in a resin-in-pulp U recovery plant. (A8c, C19a; U)

682-A. A Survey of the Iron Ore Industry in Canada During 1957. T. H. Janes and R. B. Elver. *Department of Mines and Technical Surveys, Ottawa, Canada, Mineral Information Bulletin MR 27,* June 1958, 116 p. $.25.
(A4; Fe, RM-n, 10-54)

683-A. Studying a Dangerous Metal. T. Raine and P. P. Starling. *Engineer and Foundryman,* v. 24, Aug. 1958, p. 55-58.

Safety precautions taken, special construction required, for Be development installation. (A7; Be)

684-A. Review of the Steel Plants. Sri Sardar Swaran Singh. *Indian and Eastern Engineer,* v. 123, July 1958, p. 7-10.

Status of Indian iron and steel industry. (A-general; ST)

685-A. High-Performance Steels. Edward A. Loria. *Machine Design,* v. 30, Sept. 4, 1958, p. 111-115.

Factors determining optimum performance include type of microstructure, heat treatment, hardenability and alloy composition. 4 ref. (A-general; ST)

686-A. Design of a Beryllium Laboratory. T. Raine and P. P. Starling. *Metropolitan-Vickers Gazette,* v. 29, Aug. 1958, p. 222-226.

Precautions taken to protect against toxicity. (A7r; Be)

687-A. Iron Ore in Canada. A. Hopkins. *Mine and Quarry Engineering,* v. 24, Oct. 1958, p. 459-464.

Deposits, production figures, future expansion. (A11a; Fe, 14-59)

688-A. Potential Tonnages of the Center Iron Sandstone in Perry County, Pa. Frank M. Swartz and Harvey J. Hambleton. *Mineral Industries Experiment Station, Bulletin,* no. 71, July 1958, p. 19-27.
7 ref. (A11a; Fe, RM-n)

689-A. New Metals in the Oil Industry. Pt. 2. Tantalum and Niobium. W. H. L. Hooper. *Petroleum,* v. 21, Sept. 1958, p. 313-315.

Physical and mechanical properties; welding and forming; typical applications.
(A-general, T28, 17-57; Ta, Cb)

690-A. A Note on Transition Metal Alloys. C. W. Haworth and W. Hume-Rothery. *Philosophical Magazine,* v. 3, Sept. 1958, p. 1013-1019.

Composition limits of possible alloys of Cr, Mo, and V with Mn, Fe, Co, Ni, Tc, Ru, Rh, Pd, Re, Os, Ir, Pt. 7 ref. (A-general; Cr, Mo, V)

691-A. Beryllium for Structural Applications: a Review of the Unclassified Literature. W. Hodge. Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 121648, Aug. 1958, 182 p. $3.
(A-general, 10-52; Be)

692-A. Gadolinium and Europium Alloys—Their Preparation. Melting and Properties. M. L. Wright, F. E. Block and H. Kato. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/696, 1958, 15 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Gd and Eu have high thermal neutron absorption properties. Extremely small quantities of these rare earth metals, when alloyed with Zr, Ti or stainless steel may be useful in the control of atomic power reactions. Alloys evaluated by metallography, corrosion testing in hot pressurized water and physical tests. 6 ref.
(A-general, P18; Gd, Eu, Zr, Ti, SS)

693-A. Zirconium Raw-Material Supply. F. W. Wessel. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1772, 1958, 9 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.), $.50.

Zircon reserves; extraction and refining techniques. 8 ref.
(A11a, C-general; Zr)

694-A. Economic Aspects and the Supply Situation for Columbium. Ronald L. Carmichael. Paper from "Technology of Columbium (Nio-

bium)", John Wiley & Sons, Inc., N. Y., 1958, p. 16-19.
(A4n; Cb)

695-A. Dust Precipitation by Sonic and Ultrasonic Vibrations. A. Willner. *Bergbau-Technik*, v. 5, no. 4, 1955, p. 201-209. (Henry Brutcher, Altadena, Calif., Translation no. 4404.)

Survey of present status of precipitation of fine dust by acoustic means. Theory of agglomeration of dust by ultrasound.
(A8a, W13c; 1-74)

696-A. (French.) **Copper in the Middle Ages. Products of the Dinant (Belgium) Artisans.** R. Vaultier. *Cuivre, Laitons, Alliages*, no. 44, July-Aug. 1958, p. 30-32.
(A2; Cu)

697-A. (German.) **Comparative Economics in the Iron and Steel Industry.** Gerhard Winkler. *Neue Hütte*, v. 3, Sept. 1958, p. 543-549.

Economy of the rotary furnace and low-shaft furnace compared. East German iron and steel economy. 17 ref. (A4, D8n; ST)

698-A. (German.) **Utilization of the Waste Heat of a Pusher Furnace Heated With Blast Furnace Gas.** Hans Weineck. *Stahl und Eisen*, v. 78, Sept. 4, 1958, p. 1246-1251.

Besides the usual air and gas recuperators, a plant for heating with circulating water is added. So, waste gas of less than 300° C. is utilized.
(A11e, W17g)

699-A. (German.) **Fifty Years Verlag Stahleisen.** *Stahl und Eisen*, v. 78, Oct. 2, 1958, p. 1361-1364.
(A2; ST)

700-A. (German.) **Steel Defects and Their Causes.** *Technik und Betrieb*, v. 10, July 1958, p. 101-102.

Significance of the upper conversion point in the formation of coarse grain. Reasons for poor wear resistance, corrosion, corrosion fatigue, cavities, surface defects, flaws, hot shortness, scaly surface, band structure. (A-general; ST, 9)

701-A. (German.) **Cost Calculation for Machine Tools.** C. M. Dolezalek. *Werkstattstechnik und Maschinenbau*, v. 48, Sept. 1958, p. 493-496.
(A5f, W25)

702-A. (Polish.) **Prospects of Metallurgical Industry Expansion in Poland Between 1960 and 1975.** Aloyzy Farnik, *Hutnik*, v. 25, No. 6, June 1958, p. 211-216.

Increase of steel production after World War II. Justification and rate of steel production growth. Importance of steel in economical progress of the nations and the world. Possibilities of substitutes for steel. Progress of world production of steel. Steel demand in Poland. Sources of raw materials and their procurement. Present and future trend of steel products manufacture according to their end use. Investment and productivity in metallurgical industry. Import and export of raw materials and Polish steel products. 8 ref. (A4, A11a; ST)

703-A. (Russian.) **Work of the Steelmaking Section of Permanent Commission of Council for Mutual Economic Assistance.** M. A. Pertsev and D. A. Smolyarenko. *Stal'*, v. 18, Sept. 1958, p. 793-796.

Conference in Dnetropetrovsk of representatives from Hungary, East Germany, Roumania, Poland and Czechoslovakia which set forth goals for increased steel production for 1958-1960 and 1960-1975. The gathering considered cooperative efforts towards improving quality, better refractory material, and special attention to production of ball-bearing steels. (A-general, A4p; ST)

704-A. (Book.) **Fourth National Symposium on Vacuum Technology, Transactions.** Wilfred G. Matheson. 176 p. 1958. Pergamon Press, 122 E. 55th St., New York 22, N. Y. $12.50.

Fundamental developments of vacuum technology and engineering: new methods and techniques, obtaining high vacuum, instrumentation, controls and other vacuum devices. Production and properties of metals and alloy films. Application of techniques in industry and research. Papers abstracted separately. (A-general, 1-73)

705-A. (Book.) **Physical Metallurgy of Uranium.** A. N. Holden. 262 p. 1958. Addison-Wesley Publishing Co., Inc., Reading, Mass. $10.75.

History, occurrence and preparation; radioactivity and nuclear reactions; crystallography; physical and chemical properties; mechanical properties; deformation; recovery, recrystallization and grain growth; transformations in U and U alloys; growth of single crystals; diffusion in U systems; radiation damage; thermal-cycling growth; design of metallic fuel elements; metallography of U. (A-general; U)

706-A. (Book.) **Technology of Columbium (Niobium).** B. W. Gonser and E. M. Sherwood. 120 p. 1958. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.

Papers presented at symposium arranged by Electrochemical Society, May 1958, considering sources and supply of Cb, extractive methods, impurity analysis, mechanical properties, effect of alloy additions, physical metallurgy and oxidation resistance. Papers abstracted separately. (A-general; Cb)

707-A. (Book.) **Thorium Production Technology.** F. L. Cuthbert. 303 p. 1958. Addison-Wesley Publishing Co., Inc., Reading, Mass. $6.50.

Uses, physical and chemical properties of Th metal and compounds; Th-bearing ores and their concentration; various steps for extracting and purifying the ore and reducing it to the metal; methods for casting and fabrication; health and safety aspects of Th production; chemical and physical methods of testing. 41 ref. (A-general; Th)

708-A. (Book-English.) **English-French and French-English Technical Dictionary.** F. Cusset. 663 p. 1957. Chemical Publishing Co., Inc., 212 Fifth Ave., New York 10, N. Y. $8.

Covers fields of metallurgy, mining, electricity, chemistry, mechanics and sciences. (A-general, 11-67)

709-A. (Book-Russian.) **Metallurgy of the Rare Metals.** I. P. Kislyakov. 232 p. 1957. Metallurgizdat, Moscow, USSR. 6R 40K.

Metallurgy of tungsten, molybdenum, columbium, tantalum, vanadium, titanium, zirconium, thorium and rare earths, uranium, gallium, indium, thallium, germanium, hafnium, rhenium, beryllium, lithium. 159 ref. (A-general; EG-b)

710-A. (Book-Russian.) **Structure and Properties of Aluminum Alloy Extrusions and Stampings.** S. M. Voronov. 248 p. Moskovskii Aviatsionny Tekhnologicheskii Institut, Moscow, USSR.

24 ref. (A-general; Al-b, 4-58, 4-59)

B Ore and Raw Material Preparation

220-B.* Examination of Used Chrome-Magnesite Refractories by Petrological and X-Ray Techniques. A. G. Cockrain and W. Johnson. *British Ceramic Society, Transactions*, v. 57, Aug. 1958, p. 511-526.

Suggested that the zonary structure found in used "blue" brick results from an attempt by the brick to reach equilibrium with the composition of the average furnace atmosphere. This results in extensive chemical and mineralogical reconstruction of the brick, the hot face constitution being more or less independent of the original brick composition. This reconstruction is considered to be a major factor in brick failure. 28 ref. (B19d; RM-h)

221-B.* Instrumentation and Control in Uranium Mills. C. M. Marquardt. *Mining Engineering*, v. 10, Sept. 1958, p. 967-971.

Control systems for crushing, grinding, classifying, filtering and drying. (B13, S18, U)

222-B.* New Process, New Plant—High Grade Iron From Inco's Concentrates. *Mining Engineering*, v. 10, Aug. 1958, p. 864-866.

Following selective reduction of the roaster product in kilns using concurrent gas-solids flow, Ni is leached in ammoniacal solutions under atmospheric pressure. Permanent magnet drum separators are used for thickening in the countercurrent leaching operation and steam kettles are used to precipitate Ni from the pregnant solution. The magnetic fines are agglomerated into 1-in. balls by pelletizing on disks and firing on a traveling grate to achieve the finished product.
(B14, B15; Ni)

223-B. Electric System Continuously Weighs and Proportions Materials in Jones & Laughlin's New Sintering Plant. *Industrial Heating*, v. 25, Sept. 1958, p. 1740, 1742, 1744.
(B16a, 1-52, X20; Fe)

224-B.* Fluosolids Roasting of Dowa's Yanahara Sulfides. Hidesaburo Kurushima and R. M. Foley. *Mining Engineering*, v. 10, Oct. 1958, p. 1057-1061.

Fluosolids treatment of pyrrhotite has given a profitable return on Cu, sulphuric acid and iron ore. Ore is crushed to $-\frac{1}{2}$ in. and conveyed to the ball mill. Feed and water additions to the grinding circuit are controlled so that a 70 to 75% solids slurry is produced. Two air-operated pumps deliver the feed to the 20-ft. I.D. fluosolids reactor. Roasting air is supplied to the windbox of the reactor at 7400 cu. ft. per min. and 5 psi. The dust-laden gas leaving the reactor passes through two stages of cyclone collectors, a balloon flue and a hot Cottrell for dust removal.
(B15q; Cu, Fe)

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

225-B.* (Rumanian.) **Variation of the Flotation Indices as Function of the Duration of the Process When It Is a Question of Producing a Single Concentrate.** Huber Panu and Bujar Georgescu. *Studii si Cercetari de Metalurgie,* v. 1, Jan-June 1956, p. 149-172.

In a previous study, Mr. Panu derived formulas for variations as function of time of two technological indices of flotation, namely, extraction of useful substance *m* and flotation speed *w*. The present work gives formulas for other technological indices: extraction of concentrate *v*, contents in useful substances *c* of the concentrate, and the yield η of the flotation. By these formulas, one can find the variation of flotation indices as a function of time if the constants of the formulas are determined by a flotation test in which the concentrate is collected in the form of one or two fractions, depending on whether the mineral is disassociated or not. 5 ref. (B14h)

226-B. British Magnesia Comes of Age. *British Steelmaker,* v. 24, Oct. 1958, p. 326-328.

The Steetley Co., Ltd., has been producing refractory magnesia from sea water and dolomite since 1937. (B19; RM-h)

227-B. Fatty Acids in Flotation. Carl Du Rietz. *Canadian Mining Journal,* v. 79, Aug. 1958, p. 81-87.

Data relating to Cu, Pb and Zn. (B14h; Cu, Pb, Zn)

228-B. (Rumanian.) **Refractory Properties of the Serpentine-Dolomite System.** Al. Braniski. *Studii si Cercetari de Metalurgie,* v. 1, Jan-June 1956, p. 197-215.

Study of the variation in the refractory properties of 80 different ceramic products, obtained by baking mixtures of serpentine and dolomite at 1450 or 1600° C. On the basis of the experimental results and of calculation three diagrams of refractories were drawn up and a comparison made with other diagrams and curves. 5 ref. (B19d)

229-B. Pretreatment of Uranium Ores. F. T. Davis and Glen E. Hanson. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/513, 1958, 10 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Methods of pretreatment to improve grade include gravity separation, size preparation, flotation. Roasting and flotation are common methods used to change chemical compositions and mineralogical associations of U ores. Character of the ore is the dominant factor in selection of a process. 8 ref. (B14, B15; U)

230-B.* (German.) **Briquetting of Ore-Lime-Coke Mixtures.** Kurt Sauberlich, Gerhard Richter and Walter Zwade. *Neue Hütte,* v. 3, Sept. 1958, p. 533-541.

Experimentally pressed briquettes of iron ores and buna lime (72.03% $Ca(OH)_2$, 21.52 $CaCO_3$, 0.09 MgO, 1.78 Fe_2O_3 + Al_2O_3, 3.75% SiO_2, 0.07 S. 1.44 C; ignition loss; 28.46%, total CaO; 66.56%) and dust coke. Ore of 0-2 mm. particle size with 10% coke and 20% minimum buna lime, pressed at 500 to 700 kg. per sq. cm., gave briquettes of 70 to 80 kg. per sq. cm. Strength decreases with coarser ore particles, increased coke or decreased pressure in manufacture; can be increased by a larger amount of buna lime, by drying and heat treatment. 13 ref. (B16d; RM-n, Fe)

231-B.* (Russian.) **Influence of Oxidizing Roasting and Screen Analysis of Titanium Concentrates on Rate of Titanium Recovery.** P. F. Snezhko and I. S. Kumysh. *Stal',* v. 18, Sept. 1958, p. 808-812.

Application of preliminary oxidizing roasting of Ti concentrates makes it possible to increase rate of Ti recovery to 76.7% with corresponding reduction of Al consumption rate and improvement of alloy quality. Preliminary roasting reduces amount of iron oxide in Ti concentrates from 36 to 14%, while reducing the coke consumption per ton of ferro-titanate by 407 kg. Best results are obtained by working with concentrates 0.075 to 0.30 mm. in size. (B15n; Ti)

232-B. Investigation of Beneficiation of Iron-Bearing Sandstone. H. L. Lovell and J. W. Leonard. *Mineral Industries Experiment Station, Bulletin,* no. 71, July 1958, p. 29-35.

13 ref. (B14; Fe)

233-B. Frothing and Collecting Agents in Tin Ore Dressing. F. B. Mitchell. *Mining Journal,* v. 251, Aug. 22, 1958, p. 196-197.

Flotation in the treatment of Sn ores. (B14h; Sn)

234-B. Effect of Calcium Fluoride Additions on Sintering of Magnesium Oxide. F. Wayne Calderwood and Dave Wilder. Ames Laboratory, Iowa State College. *U. S. Atomic Energy Commission ISC-910,* July 1957, 50 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.

Additions of calcium fluoride to a particular commercial grade of magnesium oxide hastened the sintering of product when fired in an induction furnace. 40 ref. (B19c, RM-h)

235-B. New Methods of Studying the Sintering Process. V. S. Abramov. *Stal',* vol. 17, no. 3, 1957, p. 195-199. (Henry Brutcher, Altadena, Calif., Translation no. 4385.)

Previously abstracted from original. See item 111-B, 1957. (B16a; Fe)

236-B. X-Ray Study of the Mineralogic Make-Up of Sinter. A. G. Slabchenko. *Zavodskaya Laboratoriya,* v. 24, 1958, p. 579-582. (Henry Brutcher, Altadena, Calif., Translation no. 4407.)

Previously abstracted from original. See item 202-B, 1958. (B16, N9; Fe)

237-B. (German.) **Concentration of the Boliden Sulphide-Ores.** Martin Winkler. *Neue Hütte,* v. 3, Sept. 1958, p. 515-523.

Complex sulphide ores (0.5-1.5% Cu, 0.2-3.0% Zn, 15-40% S) crushed and fine-crushed and floated below ground or in central plants. 4 ref. (B14; Cu, Zn, RM-n)

Extraction and Refining

314-C.* Separation of Niobium and Tantalum by Liquid Extraction. Ernest L. Koerner, Jr., Morton Smutz and Harley A. Wilhelm. *Chemical Engineering Progress,* v. 54, Sept. 1958, p. 63-70.

Acid dissolution of columbite, leaching with hexone, separation of Cb and Ta with hexone, oxide conversion and solvent recovery of oxides. 9 ref. (C19; Cb, Ta)

315-C.* (French.) **Dissolution of Uranium From French Ores by Oxidizing Attack.** A. Graire. *Energie Nucleaire,* v. 2, Apr-June 1958, p. 116-119.

Dissolution of U from pitchblende ores is generally accomplished by oxidizing sulphuric attack, oxidizing agent containing either pyrolusite, ferric sulphate, nitrates or chlorates. In all cases, ferric sulphate appears to be intermediate compound of the solubilization reaction. Previously used methods of leaching ash appear to be directly applicable today in U recovery. For U as well as for Cu, duration of leach, temperature of solution, concentration in Fe^{+++} are principal factors determining reactions of dissolution. (C28j; U)

316-C.* (French.) **Manufacture of Aluminum Conductor Wire by the Properzi Process at the St. Jean-de-Maurienne Plant of the Pechiney Co.** Andre Crevot and J. C. Beguin. *Revue de l'Aluminium,* July-Aug. 1958, p. 751-756.

Properzi machine produces wire rod directy from molten Al. Metal is poured into triangular throat of casting wheel and rough rod obtained moves continuously through a 13-stand rolling mill. Wire is wound in 2250-lb. coils by specially designed double coiler, reducing butt welding requirements before wire-drawing operations. Improvements in metallurgical control and process conditions at this installation have eliminated need for heat treatment of coiled rod, and in case of rod made of "Almelec", cracks formerly developed during solidification of rough stock and subsequent rolling no longer appear. (C5q, 1-52, F28; Al)

317-C.* (French.) **Process for Purification of Solutions of Plutonium Nitrate and Preparation of Metallic Plutonium.** S. Chambers and T. G. Hughes. *Energie Nucleaire,* v. 2, July-Sept. 1958, p. 202-206.

Plutonium nitrate solution, separated by extraction with dibutyglycol from solution obtained by dissolution of uranium bars, is concentrated by evaporation and purified by extraction with a mixture of tributyl phosphate and kerosene. Residual impurities from reagents and apparatus can be eliminated by a second purification in glass equipment. Nitrate solution is concentrated: nitrate is transformed into an oxide, then a fluoride, and finally into metal by reduction by calcium or magnesium. Impurities, which represent less than 1% by weight, are composed of Fe, Ni, Cr and U. 4 ref. (C-general; Pu)

318-C. Separation of Tantalum-Columbium by Solvent Extraction. K. B. Higbie and J. R. Wearing. *U. S. Bureau of Mines,* July 1956, 53 p.

(C19, Cb, Ta)

319-C.* (Rumanian.) **Extraction of Nickel From Minerals of the RPR by the Hydrometallurgical Method. Ammoniacal Process.** Al. Lupu and Ana Boiangiu. *Studii si Cercetari de Metalurgie,* v. 1, Jan-June 1956, p. 75-105.

Survey of work done from 1952 to 1954 for exploiting serpentines. Use of the ammoniacal process which is generally applicable to basic gangue minerals. Influence of degree of crushing, temperature and duration of roasting, addition of substances favoring reduction and degree of Ni

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

extraction, concentration of the washing solution, relation between solution and the material subjected to washing, duration of washing process. Variations of the process for extraction of magnesium oxide. 11 ref. (C19; Ni)

320-C.* (Rumaian.) **Contributions to the Problem of Continuous Cyanidation of Auriferous Minerals.** R. Badescu and Gh. Vanci. *Studii si Cercetari de Metalurgie,* v. 1, Jan-June 1956, p. 173-195.

From mathematical analysis of the process of continuous cyanidation, the following conclusions can be drawn: (1) The quantities of insufficiently cyanided mineral are smaller for installations incuding a higher number of reservoirs with smaller partial volumes. (2) Exceeding a certain output limit leads to insufficiently cyanided quantities of mineral, which are higher for installations with reservoirs of smaller dimensions. (C19p; Au)

321-C.* (Slovenian.) **Utilization of Nickel-Bearing Serpentines and Silicate-Oxide Ores in Nickel Production.** Krsto Cazafura, Joze Zakrajsek and Janex Wohinz. *Rudarsko Metalurski Zbornik,* no. 2, Summer 1958, p. 147-168.

Experiments with ores of 0.18 to 1.40% NiO, 0.0001 to 0.099% CoO, 6.68 to 57.35% Fe_2O_3, 0.80 to 5.54% FeO, 0.12 to 0.37% MnO, 1.33 to 3.35% Cr_2O_3, 2.27 to 2.30% Al_2O_3, 0.52 to 3.50% CaO, 5.98 to 38.13% MgO, 0.16 to 1.15% Na_2O, 0.20 to 0.47% K_2O, 17.78 to 49.53% SiO_2, 0.30 to 0.65% S, 0.14% SO_2, 0.33% P_2O_5, 0.002 to 0.006% As_2O_3, 0.20 to 1.64% CO_2, concerning the possibility of concentration by mechanical, hydromechanical and magnetic separation showed negative results. (C-general; Ni)

322-C. Chemicals in Ore Processing—a Fifty-Year Review. Raymond E. Byler. *Industrial and Engineering Chemistry,* v. 50, Sept. 1958, pt. 1, p. 50A-53A.

Hydrometallurgy, leaching, flotation. (C19, B14h)

323-C. Separation of Uranium and Thorium. S. V. Suryanarayana and B. H. S. V. Raghava Rao. *Scientific and Industrial Research Journal,* v. 17B, Aug. 1958, p. 310-312.

Simple and direct ion-exchange method suggested. Both elements are absorbed by the resin (Amberlite IR) from which U can be eluted first with 1.70*N* hydrochloric acid. 6 ref. (C19s; Th, U)

324-C. Some Experiments on the Fused Salt Processing of Liquid Metal Fuels. J. K. Higgins. *United Kingdom Atomic Energy Authority, AERE M/M 194,* 1958, 7 p.

Reaction between a fused sodium, potassium, magnesium chloride eutectic and a liquid bismuth solution containing small amounts of cerium (100 ppm. by wt.) and uranium (1000 ppm. by wt.). Experimental results for the transfer of Ce and U from the metal to the salt phase in a silica container. It is concluded that contamination from this container presents serious difficulties to an electrolytic method for the processing of liquid metal fuels. 15 ref. (C23p, T11g, U, Bi, Ce)

325-C. Precipitation of Thorium as Thorium Hydride From Thorium-Magnesium Solutions. Paul F. Woerner and P. Chiotti. Ames Laboratory, Iowa State College. *U. S. Atomic Energy Commission, ISC-928,* Aug. 1957, 42 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.25.

The extent to which thorium can be precipitated from the Th-Mg solutions as the dihydride was determined by reacting purified hydrogen gas at 1 atm. pressure with the liquid metal solutions. 14 ref. (C27; Th, Mg)

326-C. Methods and Operations at the Yerington Copper Mine and Plant of the Anaconda Co., Weed Heights, Nev. M. Clair Smith. *U. S. Bureau of Mines, Information Circular 7848,* 1958, 37 p.

The exploration, development, equipment and mining of a large, oxidized-copper ore deposit by openpit methods, the leaching of the ore with sulphuric acid solution and recovery of the Cu as cement copper. 6 ref. (C19n; Cu)

327-C. Remelting of Steel and Alloys in Vacuum Arc Furnace. G. N. Okorokov, A. Yu. Polyakov and A. M. Samarin. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 5, May 1958, p. 59-62. (Henry Brutcher, Altadena, Calif., Translation no. 4339.)

Experiments on the removal of gases and nonmetallic inclusions from steels and alloys by remelting in a vacuum arc furnace. (C25, D8m, W18s, 1-73; ST)

328-C.* (French.) **Use of Copper as a Cation Exchanger in the Separation of Rare Earths by Ion Exchange With the Help of Ethylene-Diamino-Tetraacetic Acid.** J. Loriers and C. Lenior. *Comptes Rendus,* v. 247, July 28, 1958, p. 468-471.

Improvements are that rare earths in complex solution with EDTA acid can be selectively fixed on a resin saturated with Cu^{2+} ions; efficient separation is obtained with EDTA acid by means of a ring of Cu^{2+} cations in columns; Cu salt solutions of EDTA acid can be used as eluents. 6 ref. (C19s; EG-g, *Cu*)

329-C.* A Review of the Extractive Metallurgy of Niobium. M. E. Sibert, A. J. Kolk, Jr., and M. A. Steinberg. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 20-34.

Chemical reduction of oxides and halides such as Cb_2O_5, K_2CbOF_5, K_2CbF_7 and $CbCl_5$ has been conducted with varying degrees of success. Aqueous electrochemical reduction has not yet yielded a metallic deposit. The electrolysis of molten baths containing K_2CbOF_5 or K_2CbF_7 has produced Cb metal. The more promising methods of preparation of Cb metal at the present include reaction of Cb_2O_5 with C, the H_2 and active-metal reduction of $CbCl_5$, and electrolysis of K_2CbF_7-NaCl melts. 71 ref. (C19, C23p; Cb)

330-C.* Recent Developments in Separating Tantalum and Niobium by Solvent Extraction. Joan L. Tews and Sherman L. May. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 36-43.

Application of the solvent extraction system, hydrofluoric acid-sulphuric acid-methyl isobutyl ketone, will yield more than 90% of the contained Ta and Cb values free of each other and free of other metallic impurities irrespective of the Ta-to-Cb ratio in the starting material. 7 ref. (C19; Ta, Cb)

331-C.* Investigation of Electrolytic Processes for Preparation of High Purity Niobium Metal. A. J. Kolk, M. E. Sibert and M. A. Steinberg. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 44-53.

Direct electrolysis of molten K_2CbF_7-alkali halide mixtures using an inert graphite anode. High-purity, cold ductile metal has been produced by this type of electrolysis under a variety of experimental conditions. A second process is the electrorefining of an impure Cb, prepared by a high-vacuum high-temperature reaction of the pentoxide (Cb_2O_5) with carbon. Difficulty has been experienced with respect to hydrogen being carried over to the cathode deposit. (C23p; Cb-a)

332-C.* The Removal of Gaseous Impurities by Vacuum Arc Melting. Stanley J. Noesen. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 150-156.

Pressure of noncondensable gases in consumable electrode arc melting measured by utilizing hollow Mo electrode. A pressure differential of 3000 microns was maintained between arc zone and furnace body with a gas evolution of 1200 microliter per sec. with the ratio of cross-sectional areas of electrode to crucible being 0.17. Mo alloy with 0.5% Ti was sintered and arc melted to determine degree of purification obtainable in this equipment. Oxygen was reduced from 780 ppm. to 4 ppm.; nitrogen from 190 to 6 ppm.; hydrogen from 130 to 0.5 ppm. and carbon from 420 to 120 ppm. (C25; Mo-b)

333-C.* What Vacuum Melting Process Shall I Use? A. M. Aksoy. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 168-176.

Basic principles, advantages and limitations of vacuum induction melting, vacuum arc melting and vacuum degassing processes. Vacuum induction melting used for production of high-quality products relatively small in size and where compositions must be closely controlled. Vacuum arc remelting suitable for large forging and quality products of less critical nature. Vacuum degassing primarily used to reduce hydrogen content of steel. 17 ref. (C25, D8m)

334-C.* (Japanese.) **Extraction of Uranium Metal.** S. Tarara. *Metals,* v. 28, Oct. 1958, p. 763-766.

U is separated by thermal dissociation, reduction of oxides and halide, and fusion electrolysis. The first method can produce high-purity U but is not suitable for mass production. The last method is applicable for UCl_4, UF_4 and KUF_5; mass production is possible but washing, desiccation, preservation and dissolution are not easy. The second method is applicable for UCl_4 and UF_4, but UCl_4 is not treated easily. Reduction of UF_4 by Ca or Mg is the most familiar method and can produce high-purity U at high efficiency. (C-general; U)

335-C. SX Line Wins Uranium From Variety of Ores. C. H. Chilton. *Chemical Engineering,* v. 65, Aug. 25, 1958, p. 104-107.

Solvent extraction plus modified ore-sampling and preparation yield uranium process dividends for Vitro Uranium Co. (C19; U)

336-C. Timken Goes to Vacuum Melting. *Iron Age*, v. 182, Oct. 23, 1958, p. 64-65.

Use of a consumable electrode vacuum arc furnace.
(C5h, T7d, 1-73; ST)

337-C. Bacterial Leaching of Manganese Ores. E. C. Perkins and F. Novielli. *Mining Congress Journal*, v. 44, Aug. 1958, p. 72-73.

15 ref. (C10n; Mn)

338-C. Solvent Extraction of Uranium. *Mining Magazine*, v. 99, Aug. 1958, p. 78-84.

Studies made by Vitro Corp. Solvent extraction or liquid ion-exchange as metallurgical processes for recovery of metals. (C19s; U)

339-C. Effect of Antimony on the Oxidation of Liquid Lead. E. Pelzel. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 9, Jan. 1956, p. 17-25. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1473.)

Previously abstracted from original. See item 106-C, 1956.
(C5; Pb, Sb)

340-C. Pryometallurgical Purification of Plutonium Reactor Fuels. J. A. Leary, R. Benz, D. F. Bowersox, C. W. Bjorklund, K. W. R. Johnson, W. J. Maraman, L. J. Mullins and J. G. Reavis. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/529, 1958, 14 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Experiments were conducted on Fe-Pu fissium and fissium prepared from 12 at. % Co-Pu base alloy melting at 410° C. Liquation and filtration, carbide slagging, halide slagging, electrorefining, recrystalization from Hg and liquid-liquid metal extraction discussed. 6 ref.
(C-general, T11g, 17-57; Pu)

341-C. Methods and Equipment for Low Decontamination Processing of Metallic Nuclear Fuels. G. E. Brand, D. I. Sinizer, E. W. Murbach, W. N. Hansen, J. R. Foltz and K. L. Mattern. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1780, 1958, 22 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Reprocessing of Th and Th-U alloys. Methods currently under investigation are arc melting, drip melting, electrolysis. 8 ref.
(C-general, A11d; Th, U)

342-C. Recent Developments in Plutonium Processing in the United States. R. D. Baker and J. A. Leary. Second United Nations Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1830, 1958, 10 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Processing methods are either aqueous or pyrometallurgical. The former includes solvent extraction (Redox and Purex processes), ion exchange and precipitation. The latter includes liquation and filtration, drossing and slagging, recrystallization, liquid metal extraction, fused salt conversion and fused salt electrorefining. 16 ref. (C19, C23; Pu)

343-C.* Electroplating and Electrorefining of Metals From the Sulphamate Bath. T. L. Rama Char. *Electroplating and Metal Finishing*, v. 11, Oct. 1958, p. 343-346.

Possibilities in India for electrorefining and electrowinning of metals, particularly Ag and Pb from battery wastes.
(C23n, C23p, A11d, L17a; Ag, Pb)

344-C.* Production of Ductile Niobium. O. P. Kolchin, N. V. Sumarokova and N. P. Chuveleva. *Soviet Journal of Atomic Energy*, v. 3, no. 12, 1957, p. 1397-1406. (Translation by Consultants Bureau, Inc.)

Production of powder containing 98.9 to 99.2% Cb by reduction of potassium fluocolumbate (K_2CbF_7) with sodium and production of ductile Cb by sintering in vacuo small bars pressed from this powder. Methods of producing ductile Cb by the carbothermic process. 20 ref. (C26, H10c; Cb)

345-C. Electrorefining of Vanadium, Chromium, Zirconium and Hafnium. D. D. Blue and D. H. Baker. Second United Nations Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/698, 1958, 17 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Electrorefining technique consists of transfer of treated metal from an anodic electrode via a molten-salt electrolyte to the cathode, where the product is deposited as a solid. Design of equipment, properties of the electrolyte, operating variables are major factors controlling transfer characteristics and product quality. (C23p; V, Cr, Zr, Hf)

346-C. A Continuous Electrolytic Process for the Preparation of Beryllium Metal. R. B. Holden, M. C. Kells and C. I. Whitman. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/717, 1958, 7 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Preparation of an amalgam of Be by electrolyzing a NaCl-$BeCl_2$ fused salt mixture into a mercury cathode. Be in amalgam form is suitable for direct hot compaction to produce dense Hg-free Be.
(C23p; Be)

347-C. Melting and Fabrication of Zircaloy. E. L. Richards, J. H. Hart, W. H. Friske and W. J. Hurford. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1010, 1958, 11 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Double, consumable electrode, arc melting process. Fabrication has been accomplished by almost all of the known metalworking processes. Wire of all gages has been produced by drawing a rod formed by hot rolling or extrusion; cups have been spun, deep drawn, flow turned, back extruded and impact extruded. Shapes have also been cast using a special vacuum melting and casting technique. 6 ref.
(C5h; F-general, G-general; Zr-b)

348-C.* (German.) **Manufacture of High-Purity Nickel.** Konrad Georgi and Eberhard Merkel. *Neue Hütte*, v. 3, Sept. 1958, p. 553-561.

Experiments on the precipitation of metallic impurities in the electrolytic refining of Ni using hydrogen sulphide and freshly prepared, fine-powdered iron sulphide. The latter substance gave best results, precipitating Pb, Sn, Bi, Cd and Cu at the same time. 19 ref.
(C27, C23p; Ni-a)

349-C.* (German.) **Electrolysis of Titanium Chloride in Melted Salt Mixtures.** Shinzo Okada, Makoto Kawane and Tomoyasu Hashino. *Zeitschrift für Electrochemie*, v. 62, no. 4, 1958, p. 437-441.

Experiments with titanium chloride in mixtures of LiCl-KCl and NaCl-KCl. The polarogram of TiCl ($2.3\text{-}10^{-4}$ mol. % of the mixture, at 400° C.) shows two upturns, the first reaches at approximately −0.9 volts E_k a summit of approximately 3.5 microns A, then the curve declines and starts to rise again at approximately −1.1 volts E_k. The $TiCl_4$ polarogram rises more uniformly. Anodic polarogram for $TiCl_3$ illustrated. 13 ref.
(C23p, C1p; Ti)

350-C. Extraction of Plutonium From Neutron-Irradiated Uranium by Uranium Trichloride and Magnesium Chloride. D. E. McKenzie, W. L. Elsdon and J. W. Fletcher. *Canadian Journal of Chemistry*, v. 36, Sept. 1958, p. 1233-1240.

11 ref. (C6; Pu, U)

351-C. Transistor-Grade Silicon. Pt. 1. Preparation of Transistor-Grade Silicon Tetraiodide. B. Rubin, G. H. Moates and J. R. Weiner. *Electrochemical Society*, Abstract no. 65, May 1957, p. 138-141.

(C1p; Si)

352-C. Transistor-Grade Silicon. Pt. 2. Zone Purification of Silicon Tetraiodide. G. H. Moates and B. Rubin. *Electrochemical Society*, Abstract no. 66, May 1957, p. 142-143.

(C28k; Si)

353-C. Contribution to the Floating Zone Technique for Refining Silicon. E. Buehler. *Electrochemical Society*, Abstract no. 68, May 1957, p. 144-151.

Two operations, recrystallization and boron removal, are carried on simultaneously in the automatic floating zone refiner. (C28k; Si, *B*)

354-C. An Ion Exchange Approach to Molybdic Oxide. Howard Cox and A. K. Schellinger. *Engineering and Mining Journal*, v. 159, Oct. 1958.

Low-grade molybdenite ore processed to recover over 90% of Mo as either MoO_3 or $CaMoO_4$ in laboratory experiments. (C19s; RM-n, Mo)

355-C. Uranium Adsorption From Leach Slurries. Paul Noble, Jr., W. I. Watson, I. M. Whittemore, R. A. Carlson, J. C. Huggins and L. A. McClaine. *Industrial and Engineering Chemistry*, v. 50, Oct. 1958, p. 1513-1516.

(C19n; U)

356-C. An Arc Furnace for Zone Refining Metals. G. A. Geach and F. O. Jones. *Metallurgia*, v. 58, Oct. 1958, p. 209-210.

Use of furnace in which metal to be melted is held in a water-cooled Cu hearth while heated by an arc from an inert electrode overcomes difficulty of contamination from the containing vessel in zone refining the more refractory or reactive metals. (C28k, X24f)

357-C. Studies of Electrolytic Refining of Zinc. Pt. 4. Process of Inclusion of Lead in Cathode Zinc. Motoo Watanabe and Seitaro Fukushima. *Tohoku University, Science Reports of the Research Institutes*, v. 10A, no. 2, 1958, p. 120-132.

A comparison was made with the Pb content of Zn deposited on two cathodes in the same cell, of which one was enclosed in an unglazed cylindrical alumina diaphragm and the other was directly immersed in

(*) Articles Available Through Photocopy Service; See Coupon, p. 91.

an electrolyte suspending a reasonable amount of lead peroxide particles. An electrolyte solution was forcibly circulated through the diaphragm to prevent growth of difference between the solution constituents, especially the Pb ion concentration, of both sides of the diaphragm. Distribution of the Pb between the ionic Pb deposition and the occlusion of lead Pb peroxide particle was determined by comparing the results from these two cathodes. (C23n; Pb, Zn)

358-C. Periodic Reduction in Particle Size of Aluminum Hydroxide During the Process of Decomposition of Aluminate Solutions. S. I. Kuznetsov. *Tsvetnye Metally,* v. 29, no. 9, 1956, p. 62-67. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-20K20R.)

(C23; Al)

359-C. Entrainment Studies on Solvent Extraction of Uranium From Heavy Slurries. D. A. Ellis, R. S. Long and J. B. Byrne. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/497, 1958, 7 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Application of solvent extraction to slurry systems. Although presence of solids does not hinder extraction of U, losses of extractant by entrainment in the aqueous effluent are increased considerably. Amount of entrainment can be reduced by proper design of mixing equipment, dilution of effluent with water or addition of surface-active agents. 4 ref. (C19a; U)

360-C. Solvent Extraction for Recovering Uranium and Vanadium From Salt-Roast-Process Solutions. J. B. Rosenbaum, S. R. Borrowman and J. B. Clemmer. Second United Nations Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/501, 1958, 10 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

U and V can be recovered from acid-leach solutions of salt-roast calcines by using a combination extractant composed of an aliphatic amine and an alkyl phosphate in a solution of kerosine containing tributyl phosphate. (C19a; Th, U)

361-C. Solvent Extraction Processing of Uranium and Thorium Ores. K. B. Brown, C. F. Coleman, D. J. Crouse, C. A. Blake and A. D. Ryon. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/509, 1958, 39 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Selected reagents and processes most representative of current U. S. process and development activities. Process flowsheets; pertinent chemistry, reagent costs, equipment, extent of commercial application. 59 ref. (C19a; U, Th)

362-C. Concentration and Purification of Uranium, Plutonium, and Neptunium by Ion Exchange in Nuclearly Safe Equipment. F. W. Tobe. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/520, 1958, 19 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Nuclear safety is obtained by using resin beds with small diameters, or by using a composite column that consists of a series of shallow beds separated sufficiently to avoid interaction of the neutrons from the individually safe beds. (C19s, A8c; U, Pu, Np)

363-C. A Rationale for the Recovery of Irradiated Uranium and Thorium by Solvent Extraction. T. H. Siddall. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/521, 1958, 24 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Technology and theory of the processing of irradiated nuclear fuels. Details of extractants. (C19a, T11g; U, Th, 14-70)

364-C. Developments in Melt Refining of Reactor Fuels. L. Burris, N. R. Chellew, S. Lawroski, G. A. Bennett, A. A. Chilenskas, M. Ader, H. M. Feder, J. B. Knighton, I. O. Winsch, J. Wolkoff and W. A. Rodger. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/538, 1958, 12 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Process consists simply of melting the fuel in an oxide crucible and holding it molten for a period of several hours. During this time purification from fission products is primarily effected by vaporization of the noble gases and other volatile elements such as cesium; and selective oxidation of the highly electropositive elements such as the rare earths followed by their removal in a surface skin or reaction layer which forms along the crucible walls. 11 ref. (C28; U)

365-C. Production of Boron-10. G. T. Miller, R. J. Kralik, E. A. Belmore and J. S. Drury. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1836, 1958, 30 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Enrichment of the B-10 isotope by the fractionation of the boron trifluoride-dimethyl ether complex; reduction of the enriched complex to elemental B. 15 ref. (C6c; B)

366-C.* (Book.) Zone Melting. William G. Pfann. 236 p. 1958. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $7.50.

Comprehensive coverage of theory and practice includes information on distribution coefficient, theory of zone refining, calculation of distribution, zone refining techniques, application to semiconductors, metals and chemicals. Continuous zone refining methods; zone leveling, zone perturbation techniques and temperature-gradient zone melting. Set of computing zone refining curves showing impurity concentrations throughout ingot as a function of the number of passes. (C28k)

D Iron and Steelmaking

478-D.* Recent Developments in Iron Smelting and Steelmaking Processes. W. M. Armstrong. *Canadian Mining and Metallurgical Bulletin,* v. 51, Sept. 1958, p. 574-576. (Also in *Transactions,* v. 51, 1958, p. 324-326.)

Development of new processes and re-examination of existing smelting and steelmaking techniques. Dwight-Lloyd-McWane process; Demag-Humbolt process; Lubatti process; flame reduction processes; Wiberg-Soderfors process; various brick kiln processes; rotary kiln process; Krupp-Renn process; fluidized bed process; Madaras process; direct-ore-to-steel process; Linz process; Kaldo process. 16 ref. (D8, D10; ST)

479-D.* Some Uses of Oxygen in Steelmaking. A. G. Raper and K. H. Hoyle. *Iron and Steel,* v. 31, Oct. 1958, p. 499-503.

Converter, L-D, Kaldo and Rotor processes and their future applications in the United Kingdom. 13 ref. (D3f, D8, D10; ST)

480-D.* Continuous Casting of Steel. Paper from "Advances in Steel Technology in 1956", United Nations, 1958, p. 87-102.

General survey of the process in various countries. Essential details of experimental and industrial plants. Special attention to Soviet technology. (D9q; ST)

481-D.* (Russian.) **Influence of Pouring Conditions on Quality of Sheet Steel.** G. A. Chikalenko and E. V. Shevbunov. *Metallurg,* v. 3, Aug. 1958, p. 14-16.

By increasing the speed with which carbon and boiler steels are poured into the ingot molds many surface defects are eliminated. These defects are due to localized concentrations of nonmetallic inclusions, which are eliminated by more rapid pouring. (D9p, 9-69; ST, 4-53)

482-D.* Research on the Use of Pure Oxygen in Refining Processes. Paul Metz. *Blast Furnace and Steel Plant,* v. 46, Oct. 1958, p. 1065-1069.

Experimental work in Belgium to improve scrap rate and modify development of metallurgical processes in basic bessemer converter includes simultaneous top and bottom blowing, with top-blow lance also used for injection of lime powder. Studies have resulted in new steelmaking process called O-C-P process. 23 ref. (D10; ST)

483-D.* Vacuum Casting Tames Supermetals. *Steel,* v. 143, Oct. 20, 1958, p. 191, 194, 196.

An initial charge is placed in the furnace and chamber evacuated. Power is then applied, and as the charge starts to melt, additional metal is added from a charge chamber. When the charge is molten, alloying elements can be added from a separate additions chamber. An immersion thermocouple indicates correct bath temperature, the batch is poured, the mold moved into the cooling chamber, and the furnace is ready for another charging. Benefits include longer part life, reduced scrap losses, lower requirements for costly alloying elements. (D8m, C25; ST, SGA-h)

484-D.* Recent Advances in the Direct Reduction of Iron Ores. J. Astier. Paper from "Advances in Steel Technology in 1956", United Nations, 1958, p. 57-65.

Laboratory experiments on reduction processes using gases at very high temperature, as in the Cyclosteel process; perfection on the semi-industrial scale of a process for re-

ducing rich, pure ores with hydrogen; the H-iron process; the Krupp-Renn process. Experience with the electric low-shaft furnace. 21 ref. (D8j; Fe)

485-D.* (Russian.) **Blast Furnace Practice at the Kuznetsk Metal Works.** N. N. Chernov. *Metallurg*, v. 3, Sept. 1958, p. 4-7.

Most of these furnaces work on low-manganese wrought iron, with 0.76 Si, 0.53 Mn, 0.049 S and 0.15 P. Heat, fuel and charge mix that will assure maximum productivity worked out for each of these furnaces. Approximate composition of a charge is 75% agglomerate, 1.0-2.0% Magnitogorsk ore and 23-24% Tashtagol'ski ore. The basicity is agglomerate is 1.4 with average Fe content of 51-52%. Limestone expenditure is 55-60 kg. per ton of iron. Gas pressure 0.6-0.65 atm. (D1; Fe)

486-D.* (Russian.) **Utilization of Manganese as Ferromanganese in Oxygen Enriched Blast Furnaces.** A. N. Red'ko. *Metallurg*, v. 3, Sept. 1958, p. 7-10.

Smelting ferromanganese from ore with 36-45% Mn. Coke has 1.6-1.8% sulphur, 11% lime and 2-7% moisture. Oxygen content in blast during smelting is 30-33%. Economies result from smelting with basic slag with increased Si content. (D1; Fe, Mn, AD-n)

487-D.* (Russian.) **Melting Transformer Steel Under Vacuum.** I. S. Prvanishnikov. *Metallurg*, v. 3, Sept. 1958, p. 16-17.

Sixteen test melts were made in vacuum furnace with 150-kg. capacity in melting transformer steel under vacuum of 0.5-1.0 mm. Hg. Conclusions were that vacuum should be used only after melting of the charge. It is better to pour metal without vacuum, preferably in an inert atmosphere. Ferrosilicon should be introduced under vacuum. To sublimate Si from liquid metal, the metal with Si should be exposed under vacuum at 0.5-1.0 mm. Hg for no longer than 10 min. (D8m; ST, SGA-n)

488-D.* (Russian.) **On Overcharging Electric Furnaces.** A. I. Sapko and Z. I. Sapko. *Metallurg*, v. 3, Sept. 1958, p. 20-21.

There is a danger in overcharging furnace by more than 30% without reconstructing it and increasing power of its transformers. Contrary to expectation, overloading furnace does not increase output but disorients and disrupts equilibrium, thus lowering productivity. Increases in furnace output should be sought in the direction of improving the electrical regime of the furnace; intensification of melting by use of oxygen; improving mechanical equipment for air-blast. (D5; ST)

489-D.* (Rumanian.) **Desulphurizing Power of Blast Furnace Slags Ability of Liquid Slags of SiO_2-Al_2O_3-CaO System to Absorb Sulphur at Temperatures of 1460 and 1550° C.** Traian Tr. Negrescu. *Studii si Cercetari de Metalurgie*, v. 1, Jan-June 1956, p. 49-64.

Experimental slags were prepared by melting in the electric furnace at 1460 and 1550° mixtures of 10 g. of pure silica, alumina and calcium oxide in the presence of synthetic pig iron (24 g.) without manganese but containing 0.8% sulphur. The purpose was to determine the maximum quantity of sulphur which can be absorbed by 100 g. of each one of the slags under conditions of equilibrium. The results confirm the fact that in liquid slags of the ternary system SiO_2-Al_2O_3-CaO, the silica present combines with a part of the lime to form groups which are inactive from the point of view of desulphurization. Aluminum does not participate directly in the desulphurization process in the temperature ranges investigated. Thus the desulphurization is due only to that part of the lime which is not tied up in the formation of the 5 CaO·8 SiO_2. 3 ref. (D11n, D1)

490-D. (Russian.) **Production of Openhearth Phosphate-Slag at the Azovstal' Mill.** F. F. Zviridenko and A. N. Popova. *Metallurg*, v. 3, Aug. 1958, p. 20-22.

(D2d)

491-D.* **Vacuum Pour Giant Ingots to Make Flake-Free Forgings.** *Iron Age*, v. 182, Oct. 30, 1958, p. 81-83.

Achieving a vacuum by the use of multi-stage steam evacuators instead of mechanical pumps, the process yields large forgings that show no flakes, no hydrogen embrittlement, fewer and smaller inclusions. Reason for melting or pouring steel in a vacuum is to reduce its gas content, particularly the hydrogen content. (D8m; ST, 4-51)

492-D. **New Experience in the Continuous Casting of Steel.** H. Krainer and B. Tarmann. *Iron and Steel Institute, Journal*, v. 190, Oct. 1958, p. 105-111.

Construction, life and cooling of ingot molds used at one plant. Three methods for studying the cooling of rectangular sections; data on rates of casting that can be achieved. Dangers of using superheated metal and of irregularities in cooling. 19 ref. (D9q; ST)

493-D.* **Control of Flow of Liquid Metal During Continuous Casting.** W. Siegfried and B. Broniewski. *Iron and Steel Institute, Journal*, v. 190, Oct. 1958, p. 162-165.

Electromagnetic method of controlling supply of liquid steel in a continuous-casting installation in a mill designed to produce welding rod. (D9q, S18q; ST, 14-60)

494-D.* **Casting Pit Practice.** G. Reginald Bashforth. *Sheet Metal Industries*, v. 35, Oct. 1958, p. 782-791.

Importance of quality of the original ingot in production of high-quality sheet. Defects which can occur in steel ingots, namely; ingot cracks, piping segregation, blowholes, surface defects, nonmetallic inclusions. Solidification of a steel ingot into distinct stages of chill, columnar and equiaxed crystals. (D9; 5-59; ST, 9-67, 9-68, 9-69)

495-D.* (Dutch.) **Recent Developments in Steelmaking.** B. Ulrich. *Metalen*, v. 13, Sept. 15, 1958, p. 304-312.

Advantages and disadvantages of basic bessemer process compared with openhearth. New and improved methods for production of converter steel, namely, the LD process (Austrian) in which oxygen of high purity (98.5-99.5%) is blown on the bath in the converter by a water cooled lance, the "Rotor" process (German) in which oxygen is blown through the bath in a rotary furnace and the "Kaldo" process (Swedish) in which oxygen is blown on the bath in a rotary furnace. (D10; ST)

496-D.* (Rumanian.) **Reduction of Iron Minerals, Siderite and Limonite, of the R. P. R. M. Ispas.** *Studii si Cerectari de Metalurgie*, v. 1, Jan-June 1956, p. 65-73.

Attempt to establish the behavior of these minerals during their reduction under various conditions of temperature, grain size and output of reducing gas. Raw and roasted siderites were used. Experiments show that the beginning of reduction is characterized by a higher degree of reduction for the roasted siderite. The grain size used was 20 mm. and the yield of the gas was 0.5 liter per min. 10 ref. (D1; Fe)

497-D. **Modern Blast Furnace Operation.** J. H. Strassburger. *Iron and Steel*, v. 31, Oct. 1958, p. 491-496.

Use of oxygen, moisture and high top pressure. (D1)

498-D. **Review of the Iron and Steel Industry in 1956.** I. P. Bardin. Paper from, "Advances in Steel Technology in 1956", United Nations, 1958, p. 1-21.

Rates of increase in iron and steel output with present levels; blast furnace production; technological advances in steelmaking processes; openhearth production; methods of using oxygen in the converter process; electric furnace steelmaking. (D-general)

499-D. **Chemical Equilibria in the Basic Bessemer Converter.** A. Decker. *Archiv für das Eisenhüttenwesen*, v. 28, Feb. 1957, p. 57-64. (British Cast Iron Research Assoc., Alvechurch, Birmingham, Translation no. 830.)

Previously abstracted from original. See item 139-D, 1957. (D3, D11s; ST)

500-D. **A Comparison of Two Carbon Bricks for a Blast Furnace.** *Instituto Nacional del Carbon Boletin Informativo*, Jan-Feb. 1957, p. 16-20. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

(D1b; RM-h39)

501-D. **A New Method of Electrode Control With Magnetic Amplifiers.** W. Kafka. *Stahl und Eisen*, v. 76, Apr. 5, 1956, p. 381-389. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 187-D, 1956. (D5; ST)

502-D. **Increasing the Range of Dephosphorization Before Decarburization During Refining of Pig Iron With Pure Oxygen.** H. Kosmider, H. Neuhaus and H. Schenk. *Stahl und Eisen*, v. 77, Sept. 19, 1957, p. 1277-1283. (British Cast Iron Research Assoc., Alvechurch, Birmingham, Translation no. 843.)

Previously abstracted from original. See item 343-D, 1957. (D10, D11r; ST)

503-D. **Some Problems of Gas Movement in Low-Shaft Furnaces.** N. P. Tabunshchikov. *Zhurnal Prikladnoi Khimii*, v. 30, no. 5, 1957, p. 710-716. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-55J19R.)

(D8n)

504-D. Lighting Flicker Caused by Electric Arc Furnaces. W. E. Schwabe. *Iron and Steel Engineer,* v. 35, Aug. 1958, p. 93-100.

Erratic changes of arc length caused by external and internal forces and random contacts between collapsing scrap are responsible for current swings. Degree of disturbance depends on relation of furnace load to capacity and network of the local power system. Hollow electrodes reduce swings appreciably; while sensitivity of incandescent light bulbs decreases with increasing wattage rating of the bulbs. (D5, W18s; ST)

505-D. Kinetics of Reduction of Magnetic Iron Ore at the Transformation Temperatures of Iron. M. I. Kochnev and A. F. Plotnikova. *Izvestiya Akademiia Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 4, 1958, p. 118-121. (Henry Brutcher, Altadena, Calif., Translation no. 4340.)

Search for a possible relationship between change in properties of iron at its transformation temperatures and rate of reduction of iron oxides under the same conditions. Data on fluctuations of rate of reduction of magnetite by hydrogen as function of temperature. Changes in electronic state of the iron atoms and not of the crystal lattice as basic cause of anomalies in chemical and physical processes. (D11r; Fe)

506-D. Effect of Basicity of Sinter Upon Coke Consumption and Production of Blast Furnaces. I. B. Strashnikov. *Stal',* v. 18, no. 5, 1958, p. 398-402. (Henry Brutcher, Altadena, Calif., Translation no. 4298.)

Previously abstracted from original. See item 324-D, 1958. (D11, D1)

507-D.* (Russian.) **Production of Forge Pig Iron.** N. E. Dunaev, E. G. Ostrovskii and N. N. Popov. *Metallurg,* v. 3, Aug. 1958, p. 8-10.

The Stalinsk Steel Mill, as a result of using low-Mn (0.8-1.2%) iron ore was able to reduce expenditure of Mn ores by 50%, increase blast furnace output by 6% with a 20-ruble saving per ton. Effective use of the low-Mn smelting method requires proper proportion of iron ores to dolomite-limestone. (D1a; CI-a, *Mn*)

508-D.* **Vacuum Stream-Degassing.** K. C. Taylor. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 157-160.

History of stream degassing; its current status in iron and steel industries. Properties and applications of stream degassed steel; operating procedures and cost; equipment design. (D8m; ST)

509-D. A Review of European Steel Plant Progress—1957. R. C. McMichael. *Iron and Steel Engineer,* v. 35, Aug. 1958, p. 73-77.

(D-general; ST)

510-D. Carbon Black in Fuel Oil for Open Hearth Furnaces. G. W. Teskey, Jr. *Iron and Steel Engineer,* v. 35, Oct. 1958, p. 71-77.

Improved furnace production was obtained through the addition of carbon black with an improvement of about 1.5% for each per cent of carbon added. (D2g; RM-k30)

511-D. Accelerated Firing Rates in Open Hearth Furnaces. E. T. W. Bailey. *Iron and Steel Engineer,* v. 35, Oct. 1958, p. 124-128.

Increase of heat input to openhearths from 750 to 1450 gphr. (125 to 220,000,000 Btu.) with concurrent improvement of other phases increased output from 16,000 to 23,500 tons per month. (D2h)

512-D. Continuous Casting of Steel in France. P. Thomas. *Iron and Steel Institute, Journal,* v. 190, Oct. 1958, p. 112-113.
(D9q; ST)

513-D. Continuous Casting of Steel in Western Germany. K. G. Speith and A. Bungeroth. *Iron and Steel Institute, Journal,* v. 190, Oct. 1958, p. 158-161.

10 ref. (D9q; ST)

514-D. Slag—Iron-Blast-Furnace. Wallace W. Key. *U. S. Bureau of Mines Minerals Yearbook, Preprint,* 1957, 9 p.

Production, consumption and technology of steelmaking slags. (D1g; RM-q)

515-D. Vacuum Melting of Steels and Other Iron-Base Alloys. H. Zakowa. *Instytutow Ministerstwa Hutnictwa,* v. 8, no. 8, p. 207-214. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 402-D, 1956. (D8; ST)

516-D. Processes Occurring in the Bosh of Blast Furnaces Operated on Oxygen-Enriched Blast. I. P. Bardin and M. Ya. Ostroukhov. *Izvestiya Akademiia Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 2, Feb. 1958, p. 7-14. (Henry Brutcher, Altadena, Calif., Translation no. 4299.)

Data on processes obtained with improved sampling equipment. Causes of irregular working of furnace when on O_2-enriched blast. (D1b, D1h; Fe, *O*)

517-D. A Blast-Furnace Top Distributor of New Design. A. S. Ayukov. *Stal',* v. 16, no. 11, 1956, p. 975-976. (Henry Brutcher, Altadena, Calif., Translation no. 4309.)

Advantages. Reliable sealing of top charging equipment; operational dependability at increased internal furnace pressures; simple construction; economical operation. (D1, W17g; 17-51)

518-D. Operation of Russian Blast Furnaces With a High Top Pressure of 1.3 Atms. E. G. Tetereviatnikov. *Stal',* v. 17, Mar. 1957, p. 200. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item no. 291-D, 1957. (D1h, 1-52; Fe)

519-D. Study of Secondary Cooling With Air-Water Mixtures in Continuous Casting. A. D. Akimenko. *Stal',* v. 18, no. 6, 1958, p. 509-511. (Henry Brutcher, Altadena, Calif., Translation no. 4310.)

Preliminary experiments on secondary cooling of continuous-cast billets with mixtures of water and air instead of water sprays alone. (D9q)

520-D. Experience in the Production and Hot Working of Light-Section Continuous Cast Steel. F. Leitner and F. Schmidt. *Stahl und Eisen,* v. 78, no. 15, 1958, p. 1028-1032. (Henry Brutcher, Altadena, Calif., Translation no. 4330.)

Design characteristics of Breitenfeld (Austria) continuous casting plant. Casting practice. Advantages and fields of application. (D9q; ST)

521-D. (Russian.) **Efficient Method for Charging Blast Furnaces.** L. Ya. Shparber. *Metallurg,* v. 3, Sept. 1958, p. 10-11.

Automation of charging of large blast furnaces; assembly, weighing and mixing of materials using a scale car, charging skip and tubular vibratory conveyors. (D1a, W12b)

522-D.* (German.) **Behavior of Various Slag Compositions During Operation and Their Influence Upon Production Results.** Wolfgang Heerwagen. *Neue Hutte,* v. 3, June 1958, p. 351-357.

In a Renn furnace experiments were conducted to determine optimal slag composition. The ratio CaO + MgO = 0.18 up to 0.19 was found to be more advantageous than more basic slags. Influence of CaO, clay, and other oxides. Operating results evaluated graphically. (D11n; ST)

523-D.* (German.) **Behavior of Chromium in the Basic Bessemer Converter.** Paul Goldstein and Erwin Eickworth. *Stahl und Eisen,* v. 78, Sept. 4, 1958, p. 1235-1246.

Chromium percentages up to 1.85% can be reduced to 0.1% by pre-refining with air or air plus oxygen. If a Cr content of 0.06% in the steel is not to be exceeded, a percentage of less than 0.15% in the crude iron is suggested. Recommended initial temperature in refining: 1400° C.; reduced temperature during second half of time, final temperature: 1350° C. Sufficient slag quantity important; with 1.85% Cr, 100 kg. slag per ton iron, high Cr percentage in rimmed steel is harmful in rolling. (D3, 1-65; AY, *Cr*)

524-D.* (German.) **Experiments on Reduced Top Discards of Steel Ingots.** Alfred Theis and Karl Nitschke. *Stahl und Eisen,* v. 78, Oct. 2, 1958, p. 1380-1383.

Experiments on 18% Cr, 8% Ni steels performed with usual exothermic feeding powders gave no satisfactory results. Neither did rammed top linings in the nozzle. Weight of top discard could be reduced 50% by the use of pressed exothermic inserts and feeding powder. (D9; ST)

525-D.* **Blast Furnace Bypass.** *Chemical Week,* v. 83, Oct. 11, 1958, p. 82, 84.

Strategic-Udy electric-arc smelting technique results in excellent performance in direct reduction of iron ore. (D8n; Fe)

526-D.* **Bottom-Blow Converter.** Marc Allard. *Iron and Coal Trades Review,* v. 177, Sept. 5, 1958, p. 560-563.

Reviews work done in France on improvement of basic bessemer steelmaking process. Suppression of "slopping" by altering the shape of the vessel, controlling the blast volume, and use of finely-divided lime in the blast to insure quick fluxing of the primary, normally highly siliceous slag. 10 ref. (D3)

527-D.* (Czech.) **Improvement of Openhearth Process by Means of Oxygen.** Ivan Pavlovic Bardin. *Hutnicke Listy,* v. 13, Oct. 1958, p. 863-868.

Consumption of 25 to 35 cu. m. of oxygen per ton of steel increases maximum output of furnaces by 17 to 20% and fuel economy rises from 10 to 15%. Oxygen is injected directly by nozzles placed in roofs of openhearth or arc furnaces. Where steel is produced from pig iron rich in phosphorus, oxygen is injected into the bath. In all cases successful use of oxygen can only be effected if the furnaces have basic roofs. (D2g; *O*)

528-D.* (Czech.) **Use of Oxygen-Enriched Blast in Soviet Blast Furnaces.** M. A. Shapovalov. *Hutnicke Listy,* v. 13, Oct. 1958, p. 872-878.

Use of blast enriched with 27% O_2 in production of foundry pig iron and blast enriched by 25% O_2 for production of openhearth pig iron results in an increase of 20% and 14-15% respectively in productivity, coke consumption remaining the same. Blast enriched by O_2 during production of ferromanganese and ferrosilicon results in similar increases in yield and a reduction in coke consumption. (D1h, *O*)

529-D.* (German.) **Metallurgy of the Low Shaft Furnace.** Karl-Friedrich Ludemann. *Neue Hütte,* v. 3, Sept. 1958, p. 523-533.

Ores melted in a low-shaft furnace with 1.35 to 22.27% Fe, varying amounts of Mn, P, S, CaO, MgO, SiO_2, Al_2O_3. Composition of iron, (3.5 to 4.2% C, varying amounts of Si, Mn, P, S) of slag and of waste gas obtained. 22 ref. (D8n, RM-q, *Mn*, Fe)

530-D.* (German.) **Electrometallurgy of Steel.** Franz Sommer. *VDI Zeitschrift,* v. 100, Aug. 1, 1958, p. 1053-1062.

Directly and indirectly heated electric arc furnaces, low-frequency and middle-frequency induction furnaces and resistance furnaces. Required properties of scrap; melting processes; refining; elimination of harmful gases such as carbon monoxide, hydrogen, nitrogen. (D5, D6; ST)

531-D.* (Russian.) **Equilibrium of the Distribution of Sulphur Between Metal and Slag in the Openhearth Furnace.** L. A. Shvartsman, A. I. Osipov, V. F. Surov, M. L. Sazonov, S. A. Telesov and A. M. Ofengenden. *Doklady Akademii Nauk SSSR,* v. 120, no. 3, 1958, p. 599-601.

Sulphur distribution influenced by the ratio of basic and acid compounds contained in the slag. It is advised to decrease the silica in the slag, if possible, during the melting period, and to keep the slag liquid by adding liquefying materials including ferrous oxide. (D2d, D11n, D11s; S)

532-D.* (Russian.) **Reduction of Iron Oxides Under High Pressure.** A. S. Tumarev and L. A. Panyushin. *Stal',* v. 18, Sept. 1958, p. 769-776.

Influence of gas pressure on speed of reduction of iron oxides in blast furnace. Grain size of iron ore 1-4 mm., intermittent gas pressure at 1-3 atm. Increased gas pressure accelerates the reduction process of iron oxides by the carbon monoxide (in the kinetic zone). Use of high pressure in blast furnace increases speed and rate of indirect reduction. The higher the velocity of gas flow the greater the influence of gas pressure on the reduction process. (D1, 3-74)

533-D.* (Russian.) **New Designs for Cooling Blast Furnaces.** S. M. Andon'ev, G. A. Kudinov and O. V. Filip'ev. *Stal',* v. 18, Sept. 1958, p. 776-780.

Experiments conducted with 1033-cu. m. capacity blast furnace on use of a thin-walled furnace shaft with surface plate coolers; vertical plate coolers with cells for crust formation for the boshes; cooling devices of improved design for the lower part of blast furnace; tuyeres and furnace hearth bottom. (D1a, W10f, 1-52)

534-D.* (Russian.) **Advantages of Grading Blast Furnace Burden Materials.** M. A. Shapavalov. *Stal',* v. 18, Sept. 1958, p. 780-781.

Sifting out of iron ore fines below 6 mm. and grading of ores is most effective means of eliminating the peripheral-axial gas flow, reducing coke consumption and increasing blast furnace productivity. 4 ref. (D1a)

535-D.* (Russian.) **Investigation of Thermal Performance of 500-Ton Openhearth Furnace.** V. S. Kocho, V. I. Grankovskii and E. A. Ploshchenko. *Stal',* v. 18, Sept. 1958, p. 782-788.

Determination of distribution of heat flow along length of bath, when injecting compressed air into furnace ports. This has made possible determination of optimum thermal conditions for heats. Tests made in basic furnaces with Cr-Mg roofs that had withstood 450 heats. The specific heat consumption for a 500-ton furnace averaged 125 kg. per ton of steel and average length of melt 12.4 hr. 5 ref. (D2h)

536-D.* (Russian.) **Desulphurization of Basic Converter Steel by Top Blowing With Oxygen.** S. I. Lifshits. *Stal',* v. 18, Sept. 1958, p. 788-793.

Steel made in converter with 20 cu. m. capacity lined with magnesite chromite brick. Oxygen use under 10-14 atm. pressure is from 56.3 to 62.3 cu. m. per ton of steel. Composition of oxygen blown pig is: 0.5% Si, 1.8% Mn, 0.09% P and 0.08% S. Satisfactory results in desulphurization of oxygen-blown converter steel can be obtained only when sulphur content in iron does not exceed 0.07%. To obtain steel from pig containing more than 0.05% sulphur, special melting methods have to be applied. (D11n, D3b)

537-D.* (Russian.) **Melting Stainless Steel From Scrap With Use of Silico-Manganese.** L. I. Teder, V. Ya. Monastyrskii and V. I. Mesyats. *Stal',* v. 18, Sept. 1958, p. 801-802.

How to reduce cost of stainless steel production. Ferro-alloys constitute 61.5% of steel and their replacement with cheaper substitutes is major goal in cost reduction. Replacement of metallic Mn by silicomanganese under certain conditions does not increase carbon content and results in considerable savings in consumption of low-carbon ferrochromium and ferrosilicon. (D9r; SS, RM-p, AD-n31, Mn)

538-D. Application of Oxygen to Openhearth Furnaces. W. Gerling and K. O. Zimmer. *Iron and Coal Trades Review,* v. 177, Sept. 26, 1958, p. 725-728. (From *Stahl und Eisen,* v. 78, Feb. 6, 1958, p. 156-160.)

Previously abstracted from original; see item 125-D, 1958. (D2g; ST)

539-D. Ferromanganese: the Spice of Steel. *Engineer and Foundryman,* v. 23, July 1958, p. 35-37.

Latest types of smelting plant at Cato Ridge, Natal, South Africa. (D5; ST, Mn, AD-n31)

540-D. Does Moisture Control Benefit Blast Furnace Air? C. E. Agnew. *Iron Age,* v. 182, Nov. 6, 1958, p. 114-117.

Examination of opposing theories of drying blast furnace air or adding controlled amounts of moisture. (D1h)

541-D. Extension of the LD Process. Pt. 1. Production of Special Steels. O. Cuscoleca and K. Rosner. *Iron and Coal Trades Review,* v. 177, Aug. 22, 1958, p. 441-448.

Adaptation of the process permits high-carbon and various grades of alloy steel to be produced. 7 ref. (D10a)

542-D. Extension of the LD Process. Pt. 2. Conversion of High-Phosphorus Iron. *Iron and Coal Trades Review,* v. 177, Aug. 29, 1958, p. 501-507.

Application of process to conversion of irons containing from 0.5 to 1.5% P if a double-slag method of operation is adopted. The second slag formed can be re-used as a first slag on the next heat, and, to tap metal cleanly from under this slag, a special taphole is incorporated in the vessel. 7 ref. (D10a; RM-q)

543-D. Modern Steelmaking Practice. *Iron and Coal Trades Review,* v. 177, Sept. 5, 1958, p. 569-574.

Steelmaking by the duplex process, slag control in the openhearth, role of immersion pyrometry in steel refining, use of basic roofs, were discussed at the 12th Junior Steelmaking Conference of BISRA at L'landudno on June 4th and 5th. (D2, D3, X9r; RM-h38)

544-D. Conversion of Low-Phosphorus Iron. H. Kosmider, A. Weyel and H. Neuhaus. *Iron and Coal Trades Review,* v. 177, Sept. 19, 1958, p. 667-673.

Oxygen-steam "mixed blast" bottom blown converter can be adapted to convert low-phosphorus irons previously unusable. 11 ref. (D3a;RM-n)

545-D. Instrumentation of "Patricia" Blast Furnace No. 3 Fairless Works. W. E. Williams. *ISA Journal,* v. 5, Sept. 1958, p. 94-98. (D1b, X-general)

546-D. Oxygen Increases Open Hearth Output. *Metallurgia,* v. 58, Oct. 1958, p. 195-196.

Oxygen lancing of openhearth furnaces has led to substantial increase in steel output compared with normal furnaces for approximately the same cost per ingot ton of steel. (D2g)

547-D. Use of Oxygen to Increase Operating Efficiency in the Tropenas Converter. *National Cylinder Gas Information Report,* no. 15, Aug. 1958, 7 p.

O_2 injection provides cleaner metal, permits reduction or elimination of ferrosilicon as a heat source, reduces blowing time and damage to refractories. (D3f; O, CI-a)

548-D. Continuous Casting of Light-Section Steel Billets and Subsequent Cross Rolling Without Process Anneal. A. S. Nikiforov. *Proceedings of First All-Union Conference on Continuous Casting of Steel,* Moscow, Oct. 1955, p. 123-128. (Henry Brutcher, Altadena, Calif., Translation no. 3951.)

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

Production process for balls used in crushing or grinding mills, based on use of continuous-cast hot billets, gas cut into short lengths and then cross rolled, quenched and tempered. (D9q, W2a, 17-57; ST)

549-D. Withdrawal of Steel and Slag Tap Holes of Openhearth Furnaces. D. I. Kuznetsov. *Metallovedenie i Obrabotka Metallov,* no. 1, Jan. 1957, p. 16-19. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

(D2)

550-D. New Methods of Deoxidation and Desulphurization of Steel With Improvement in Its Quality. V. A. Skachko and N. P. Merenkov. *Stal',* v. 17, 1957, p. 521-522. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4047.)

Previously abstracted from original. See item 300-D, 1957. (D9r; ST, *Al*)

551-D. Blast Furnace Performance Improved by Changing the Blast Composition. E. M. Lokshin and Yu. S. Borisov. *Stal',* v. 18, no. 5, 1958, p. 391-397. (Henry Brutcher, Altadena, Calif., Translation no. 4403.)

Previously abstracted from original. See item 323-D, 1958. (D1h, D11k)

552-D. Effect of Vacuum Melting Upon Steel Quality. Ya. M. Bokshitskii. *Stal',* v. 18, no. 6, 1958, p. 520-525. (Henry Brutcher, Altadena, Calif., Translation no. 4405.)

Experimental heats of 27% Cr steel at furnace pressures ranging from 760 down to 0.05 mm. Hg; effect on C, Mn, Si, Cr, P, S and especially O_2 and N_2 contents. Volatilization of Mn; interaction between C and O_2 and S and O_2; extent of degassing by vacuum melting. Impact strength of vacuum melted 27% Cr steel as affected by C content. Tensile and impact properties in forged and heat treated state as function of pressure during melting. (D8m, Q27a, Q6n; ST)

553-D. Structure and Properties of Slags Obtained in Smelting Processes. Pt. 1. Measurement of the Viscosity of Slags of the Ferrous Oxide-Alumina-Silicic Acid System. P. Rontgen. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 9, no. 5, 1956, p. 207-214. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. CSIRO-3414.)

(D11n; RM-q)

554-D. (German.) **Economic Considerations of the Induction Melting of Iron and Steel.** Karl-Heinz Brokmeier and Walter Lang. *Giesserei,* v. 45, Aug. 14, 1958, p. 465-469.

Operating costs with city frequency and medium-frequency crucible furnaces. (D6, W18a; ST)

555-D. (German.) **Economic Comparison Between Different Steel Production Processes.** Karl F. Tudemann. *Neue Hütte,* v. 3, Aug. 1958, p. 462-474.

Economy of different steel production processes under existing and future conditions in the German Democratic Republic. 15 ref. (D-general, A4)

556-D. (German.) **Pressure Distribution in the Openhearth Furnace.** Vaclav Parma. *Neue Hütte,* v. 3, Sept. 1958, p. 550-553.

Pressure in the hearth space measured in different places and recorded for whole melting process by plotting time curves. Highest average pressure measured at the center of the hearth roof. 13 ref. (D2, 3-74)

557-D. (German.) **Effect of Physical Properties of Coke on the Working of a Blast Furnace.** Werner Himsel. *Stahl und Eisen,* v. 78, Sept. 4, 1958, p. 1225-1229.

(D1; RM-j43)

558-D. (German.) **Mathematics and Statistics of the Blast Furnace Operation Using Characteristic Values.** Volkmar Steinecke. *Stahl und Eisen,* v. 78, Sept. 4, 1958, p. 1229-1235.

Mathematical statistical procedure for evaluating production records and the results of experiments. 17 ref. (D1, S12)

559-D. (Book.) **Advances in Steel Technology in 1956. Prepared by the Secretariat of the Economic Commission for Europe.** 1958. 107 p. United Nations, Geneva. (Available from Columbia University Press, 2960 Broadway, New York 27, N. Y.) $1.

General review of technological developments; six papers dealing with new processes that have reached the stage of industrial application. Papers abstracted separately. (D-general)

560-D. (Book—German.) **Handbook of Continuous Casting.** Erhard Herrmann. 916 p. 1958. Aluminium-Verlag GmbH., Jägerhofstr. 26-29, Düsseldorf, Germany. DM 300.

Review of publications, description of metals and apparatus; application to various metals. (D9q, C5q)

561-D. (Book—Russian.) **Computations on the Composition of Charges for the Scrap-Ore Openhearth Process.** A. M. Bigeev. 196 p. 1957. Metallurgizdat, Sverdlovsk, USSR, 7R 90K.

Chemical processes taking place in the openhearth furnace. Computations on the right quantities of ore, limestone, other nonmetallic additions, deoxidizing and alloying additions. (D2a, D11; RM-n, RM-b, AD)

562-D. (Book-Russian.) **Formation of Slag in the Basic Openhearth Process.** P. V. Umrikhin. 195 p. 1958. Metallurgizdat, Sverdlovsk, USSR, 7R 75K.

Distribution of slag-forming materials in the furnace during the scrap and scrap-ore processes. Significance of the slag in dephosphorization, decarburization and desulphurization and influence on hydrogen content. 119 ref. (D2d, D11n, D11q; RM-q)

E Foundry

763-E.* Casting Iron Patterns in Zircon Sand. C. W. Yaw. *Foundry,* v. 86, Oct. 1958, p. 74-75.

Reduced machining not only cuts costs but leaves the pattern with a good wearing surface. (E17; CI, NM-f45)

764-E.* Shrinkage Prevention in Bronze Castings. Clyde L. Frear. *Foundry,* v. 86, Oct. 1958, p. 84-89.

Correct use of risers, pencil gates, runners, chills and padding to insure sound castings. Optimum pouring technique. (To be continued.) (E22; Cu-s)

765-E.* (French.) **New Hot Blast Cupola With Direct Recovery of Heat From Charging Hole Gases.** Georges Ulmer. *Fonderie,* June 1958, p. 263-272.

Inexpensive recuperator is mounted directly over charging hole, also acts as stack, combustion chamber and heat exchanger. Design and operation based on fact that charging hole gases contain, under average conditions, about 50% of heat produced by coke consumed, and that, to heat air required for combustion of coke to 400° C., for example, it suffices to recover only a third of sensible and latent heat from these gases. Use of this device reduced coke consumption, increased output of cupola formerly operated on cold blast. Good metallurgical results are obtained, as well as flexibility of operation. 8 ref. (E10a, W18d)

766-E.* (French.) **Contribution to the Study of Sprue Requirements in the Steel Foundry. Testing of a Simplified Method of Sprue Design Applied to Case of Three Rims.** Marcel Jaumain. *Fonderie,* June 1958, p. 273-278.

Sprues for rims of different dimensions were calculated by method described by Bishop, Myskowski and Pellini in *Transactions* of American Foundrymen's Society. Finished castings were sound except for a few minute flaws attributed to sand inclusions. These applications, plus others previously made, confirm validity of method. (E22; ST)

767-E.* (French.) **Special Stoving Processes. Use of Infrared Radiation for Mold Drying and Core Baking.** *Fonderie,* June 1958, p. 283-287.

Surface and internal temperatures of molds being dried by gas or electrically produced infrared radiation; depth and degree of drying as function of power of emission and duration of exposure. Gas-heated ovens gave best results. Cores over 50 mm. thick were not successfully baked by infrared radiation alone, but good results were obtained by combination of radiation and convection. Gas is favored over electricity for both jobs because of high emissive power, more uniform radiation and relatively low cost. (Concluded.) (E19, E21h; RM-m)

768-E.* (German.) **Nonferrous Melting Practice.** W. Schröder. *Giesserei-Praxis,* no. 16, Aug. 25, 1958, p. 311-315.

Six important alloys, their characteristics, individual melting procedures in types of furnaces. Operation of furnaces, introduction of raw materials and skimming of slags. Alloys discussed are tin bronze, red brass, brass, aluminum bronze, lead bronze, and lead-tin bronze. (E10; Cu-b)

769-E.* (Italian.) **Materials and Techniques Used in the Preparation of Molds and Cores in the Brass Foundry.** L. Alladia. *Fonderia Italiana,* July 1958, p. 256-258, 264.

Sand, clay, metal, plaster and wax as mold materials; casting techniques in which molds made of these materials can be used; binders and additives. Selection of sand and binders for cores; coremaking by shell molding and CO_2 processes; baking. (E18, E19, E21; Cu-n)

770-E.* (Russian.) **Centrifugal Casting of Iron Water Pipe in Sand Molds.** Z. A. Grinberg. *Metallurg,* v. 3, Aug. 1958, p. 31-33.

Process is based on principle that the metal, solidifying in the mold, thickens considerably as result of the centrifugal force. Wall thickness of pipe produced by this method is 20% less, while length of pipe is 1.5 times greater than by usual methods, resulting in considerable saving of metal. (E15; CI, 4-60)

771-E.* (Spanish.) **Oxygenation of Gray Cast Iron.** Arturo Arasti. *Instituto del Hierro y del Acero,* v. 11, Apr-June 1958, p. 91-96.

Laboratory experiments demonstrated possibilities of controlling Si content of gray iron castings by injection of oxygen in ladle, without disturbing percentages of other elements in molten metal. Pressure and duration of injection have important effect on ultimate Si content. Pouring with a siphon ladle is recommended to separate highly fluid slag resulting from oxygen treatment. Specially designed injection device. 8 ref.
(E23, E25, W18g; CI-n)

772-E.* (German.) **Factors in Synthetic Molding-Sand Preparation.** A. Hohmann. *Giesserei-Praxis,* v. 18, Sept. 25, 1958, p. 365-366.

Properties of molding sand can be changed by preparation. Influencing factors are water content, amount of clay, viscosity of the clay, smoothness of the clay layer surrounding the sand grain, relationship between preparation time and firmness, volumetric weight, compressibility. (E18)

773-E.* (Rumanian.) **Study of Factors Determining Grain Size in Magnesium Alloys.** Georgeta Dan and Aurelia Protopopescu. *Studii si Cercetari de Metalurgie,* v. 1, Jan-June 1956, p. 21-36.

Fine grain gives superior properties and better heat treatment. Tests showed the influence on grain size of chemical composition, progress of melting and introduction of substances capable of separating out carbon. Mn and Zn have almost no influence while aluminum has a distinct grain-refining effect. Super heating from 750 to 1050° produces a finer grain, the higher the temperature. Longer stays at lower temperatures partly compensate the effect of higher temperatures. Similar result also obtained by inoculation with methane or butane gas at lower temperatures (750-800° C.). This is a simple and economical method to obtain fine grain. 11 ref. (E25q; Mg)

774-E.* **The Ejection of Deeply-Cored Die Castings.** H. K. and L. C. Barton. *Machinery (London),* v. 93, Sept. 24, 1958, p. 723-733.

Problems associated with ejecting castings produced from deep cavities. Line drawings of typical push-rod and hydraulic cylinder ejection mechanisms, also of cores arranged for withdrawal by a finger cam and variations in wall thickness which can result from slight displacement of the core. By use of a retractable core arranged to slide in the direction of die travel, improved accuracy can be obtained. Dies arranged to be displaced transversely prior to the ejection of the castings and difficulties associated with die castings which incorporate long steel inserts. (E13)

775-E.* (German.) **Structure and Properties of Aluminum Castings With Inclusions.** A. G. Spasskij. *Freiberger Forschungshefte,* v. B24-3, July 1958, p. 7-18.

Inclusions may form if the Si in SiO_2 is replaced by Al. This reaction is favored by the use of a borax, cryolite or fluoride flux, while it is hindered by chlorides, especially barium chloride. It is eliminated by applying a chalk layer to the clay lining or by using magnesite or chromium magnesite linings. Changes in structure explained by invisible, equally distributed foreign materials.
(E25q; Al, 9-69)

776-E.* (German.) **Shrinkage of Magnesium-Treated Cast Iron.** K. I. Wastschenko, R. P. Todorow and and W. W. Shishtschenko. *Freiberger Forschungshefte,* v. B24-3, July 1958, p. 47-83.

Cast iron with 3.23% C, 3.04% Si, 0.60% Mn, 0.084% P, 0.008% S, 0.045% Mg held at 1350° C. showed an increase of shrinkage properties by a gradual loss of Mg. Influence of Si and P and of cooling rate. Cavities favored by Mg, C, hindered by Si. 15 ref. (E25n, 2-60; CI, *Mg*)

777-E.* (German.) **Investigations on Cupola Furnaces.** Wilhelm Patterson. *Giesserei,* v. 45, Sept. 11, 1958, p. 525-531.

Furnace loss by application of hot blast air thought to be avoidable by choosing a coke of increased density and right size (probably 80-100 mm.), incrusting it with cement and adding calcium carbide. Producing high temperatures by heating the blast air with additional fuel rather than by increasing the coke charge is suggested. (E10a)

778-E.* (German.) **Use of Calcium Carbide in the Cupola Furnace.** Rudolf Schulze. *Giesserei,* v. 45, Sept. 11, 1958, p. 542-545.

Addition of 2-3% calcium carbide to raise the temperature in the zone above the tuyeres by more active coke combustion. The amount of calcium carbide added depends on the kind of iron or steel melted. Advantages are one-quarter less coke consumption, reduced amount of S in the iron, improved furnace efficiency, hotter iron and hotter slag, increased Si and C, faster starting of furnace. (E10a, E25r; CI)

779-E.* (German.) **Service Behavior of Clay-Bound Green Molding Sands.** Wilhelm Patterson and Dietmar Boenisch. *Giesserei,* v. 45, Sept. 11, 1958, p. 565-567.

In green sand molds, a moisture zone of lower strength forms under the sand surface. The strength of this moisture zone is measured by a new method. As a result sand expansion defects in castings can be prevented. (E18r, E19a)

780-E.* (German.) **Water Glass as Binder in Molding and Core Sands.** F. W. Nield and D. Epstein. *Giesserei,* v. 45, Sept. 11, 1958, p. 567-575.

Experiments with quartz sand "Redhill F" and water glass in a weight proportion of SiO_2 to Na_2O from 2.0 to 3.3. In CO_2 treatment water glass with proportion of 2.0 gave highest compressive strength of mold. The smaller the proportion of SiO_2 to Na_2O, the longer the time required for CO_2 treatment; however, strength was improved. (E18n)

781-E.* (German.) **Shrinkage of Aluminum Alloys in Sand Casting.** Hans Reininger. *Giesserei Praxis,* no. 17, Sept. 10, 1958, p. 326-337.

Seven Al alloys, chlorinated and unchlorinated, studied for surface and subsurface defects and hot tears. Two kinds of solidification—simple shell and skeleton-type—with different crystal formation, influence defect formation. Importance of temperature during casting (uneven distribution of heat favors defect formation: and solidification (freezing sensitivity). 27 ref.
(E25n, E11; Al)

782-E.* (German.) **Synthetic Resins and Their Use in Foundries.** *Giesserei Praxis,* no. 17, Sept. 10, 1958, p. 338-339.

Synthetic resins used increasingly in patternmaking. Many have good mechanical properties, moisture and aging resistance, excellent adhesion on metals and stability. Advantages in general: quick and cheap to produce; unlimited capacity for copying; little wear. Care must be exercised during production because of tension sensitivity, lower fatigue limit and temperature dependence. Production of synthetic resin patterns. (E17)

783-E.* (Japanese.) **Recent Electrolytic Advances in Preparation of Molds.** N. Kinoshita. *Metals,* v. 28, Sept. 1958, p. 694-699.

Electrodeposited metal layer on an electrode can be peeled off to make a replica of such things as optical diffraction gratings, records, objects of art, typographical plates, radar parts, jet engine parts and Venturi tubes. Thickness of deposited layer is 10^3 times that of plating. Speed of deposition is 0.1 to 2 mm. per hr. Cu, Ag, Ni, Fe, Co, Au, Zn and W alloys can be deposited. (E19)

784-E. **Investment Casters Push Ceramic Shell Use.** Ted Operhall. *Foundry,* v. 86, Oct. 1958, p. 68-70.

Commercial production of castings in ceramic shell molds has shown a number of advantages over use of investment molds. (E19c)

785-E. **A Brass Foundry Can Have Good Working Conditions.** William G. Gude. *Foundry,* v. 86, Oct. 1958, p. 76-79.

Sand preparation, molding, melting, pouring and shakeout operations. (E11, 18-67; Cu-n)

786-E. **Quality Control Tests in the Shell Process.** Earl W. Jahn. *Foundry,* v. 86, Oct. 1958, p. 80-81.

Checking the physical characteristics of shell molded castings and sand mixes can be simplified by use of a standard pattern to produce test castings and molds for making sand specimens. (E19c)

787-E. **Mechanized Molding Matches Manual Skill.** *Metalworking Production,* v. 102, Oct. 3, 1958, p. 1727-1732.

Molding and pouring are completely automatic in this installation. Only core setting remains a manual operation. Sand, mold density, flask filling, flask design. (E19, E21, 18-74; CI-s)

788-E. **Interim Report on Vacuum Die Casting.** *Precision Metal Molding,* v. 16, Oct. 1958, p. 62-63.

Advantages and disadvantages of the vacuum process. (E13, 1-73)

789-E. A New Hot Blast Cupola With Direct Recuperation of the Heat of the Exhaust Gases. G. Ulmer. *International Foundry Congress, Stockholm,* Paper no. 26, Aug. 19-24, 1957, p. 643-668. (British Cast Iron Research Assoc., Alvechurch, Birmingham, Translation no. 839.)

(E10a, W18d)

790-E. (German.) **Investigations Into the Shrinkage Behavior of Grey Cast Iron.** R. Ziegler. *Giesserei-Nachrichten,* no. 2, May 1957, p. 9, 10, 13-18, 21.

(E25n; CI-n)

791-E. Recent Developments in the Field of Steel Castings. W. A. Stauffer. *Giesserei,* v. 43, no. 18, Aug. 30, 1956, p. 508-519. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB95.)

Previously abstracted from original. See item 200-V, 1956. (E-general; CI)

792-E. Contribution to the Theory of the Water-Glass Molding Method. (CO_2 Process.) Pt. 1. S. Bohmer. *Giessereitechnik,* v. 3, Jan. 1957, p. 6-9. (British Cast Iron Research Assoc., Alvechurch, Birmingham, Translation no. 838.)

Previously abstracted from original. See item 143-E, 1957. (E19, E21)

793-E. (French.) **Manufacture and Use of Large Aluminum Die Castings. Pt. 3.** A. F. Bauer. *Revue de l'Aluminium,* July-Aug. 1958, p. 787-791.

(Concluded.) (E13; Al)

794-E. (Italian.) **How to Melt Aluminum Alloys Correctly.** *Fonderia,* v. 7, Aug. 1958, p. 356-360. (E10; Al-b)

795-E. (Italian.) **The New G. Fischer Foundry.** *Fonderia,* v. 7, Aug. 1958, p. 337-342.

Completely automated foundry in Shaffhausen, Switzerland, designed by American and Swiss engineers, has two operating units, can produce 36,000 tons of malleable iron castings per year with labor force of only nine men involved in direct operations. Two automatic forming units produce a maximum of 300 complete forms per hr., or one every 12 sec. Facilities and procedures. (E11, W19; CI-s)

796-E. Mechanical Properties of Die-Cast Irons. G. K. Gedevanishvili and R. B. Zvenitskaya. *Liteinoe Proizvodstvo,* no. 3, Mar. 1958, p. 10-11. (Henry Brutcher, Altadena, Calif., Translation no. 4336.)

Previously abstracted from original. See item 384-E, 1958. (E13, 3-74; CI)

797-E. Casting Uranium-5% Zirconium-1.5% Niobium Alloys Into Zirconium and Zircaloy-2 Containers. J. W. Frank and R. E. Macherey. Argonne National Laboratory. *U. S. Atomic Energy Commission ANL-5442,* July 1958, 50 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.50.

Uranium and high-uranium alloys are bonded to Zr and Zr alloys by a direct casting method. Unalloyed U and U alloyed with 5% Zr and 1.5% Cb were cast into Zr and Zircaloy-2 molds of various shapes and sizes. Castings made in cans of circular cross section were well bonded and sound, provided the molds were out-gassed at elevated temperature before use and proper preheating precautions were observed. 9 ref. (E16, L22; U, Zr)

798-E. (Czech.) **Structural Changes on Casting Stainless Steel.** S. J. Maresh Skala. *Ceskoslovenska Stomtologie,* no. 2, 1957, p. 57-65.

Stainless steels with 18% Cr and 8% Ni, or with 14% Cr and 8% Ni, are used in dentistry. Increased content of C and inhomogeneity of structure produce brittleness and low corrosion stability of the steel. The present method of melting by electric arc leads to an increased C content, whether the usual or high-grade electrodes are used. The amount of carburization increases with rapid melting. A low C content was achieved only by autogenous (gaseous) melting. Structural inhomogeneities arising on casting were removed by annealing at 1150° for 2 hr. and subsequently quenching in water. (E10, T10e, 17-57; SS)

799-E.* (German.) **Reasons for "Gassing" of Aluminum Castings.** H. Kessler. *Aluminium,* v. 34, Sept. 1958, p. 518-521.

Porosity of Al castings caused by hydrogen from combustion gases of the fuel or atmospheric moisture. Presence of hydrogen tested by putting a crucible with melt in a receptacle and slowly exhausting the air. Hydrogen, if present, changes surface appearance after solidification and cavities are found after sawing. Best way to remove hydrogen is to slowly supply chlorine in a "converter" or by carbon pipes under the surface. (E25s; Al, 9-68)

800-E.* (German.) **Dimensioning of Feeder Heads and Risers.** W. Koppe. *Giesserei,* v. 45, Aug. 14, 1958, p. 469-474.

General formula for computation of volume riser plus feeder head. Coefficients for different shapes of castings and different materials evident from tables. For cast iron, special correction factors taken into consideration because of the expansive precipitation of eutectic graphite. Dimensioning of gates. (E22; CI)

801-E.* (Japanese.) **Molding Techniques in the Soviet Union.** *Metals,* v. 28, Oct. 1958, p. 769-771.

The most significant contributions are oxygen blow into the melting furnace, application of isotopes and gaseous molds. (E10, E19, 1-59)

802-E. Vacuum Die Casting Saves on Machining. *Design Engineering,* v. 4, Sept. 1958, p. 45-47.

Steps followed by Aurora Metal for vacuum die casting of aluminum bronze and silicon bronze. (E13, 1-73; Au-s, *Si*)

803-E. A French Glossary for Foundrymen. Pt. 3. *British Cast Iron Research Association, Bulletin,* v. 14, Sept. 1958, p. 492-500. (E-general, 11-67)

804-E. What Has Centrifugal Casting to Offer? *Design Engineering,* v. 4, Oct. 1958, p. 56-59.

Advantages of hollow cylindrical castings include homogeneity, density, thin, smooth walls, good cost factors. (E14)

805-E. Improved Facilities for the Production of Castings by the Mercast Process. *Machinery (London),* v. 93, Oct. 1, 1958, p. 777-780.

Mercast process of precision investment casting. Pattern and moldmaking shop, foundry and finishing department and toolroom are housed in a single building. Furnaces of different types are installed for melting high-alloy steels, Al and Cu-base alloys; a 56-lb. vacuum furnace is available for both casting and melting. Details of a complex built-up mold for production of mercury patterns for an intricate gas turbine component. (E15; Hg)

806-E. Hot Blast for Small Foundry Cupolas. *Mechanical World and Engineering Record,* v. 138, Aug. 1958, p. 362-363.

Installation of independently oil-fired hot blast equipment resulted in savings of coke, ferrosilicon and manganese, increased melting rate. (E10a, W18d)

807-E. The "Mercast" Process. *Metal Treatment and Drop Forging,* v. 25, Sept. 1958, p. 361-362.

(E15; Hg)

808-E. Automatic Casting Cuts Costs. Pt. 2. *Metalworking Production,* v. 102, Oct. 10, 1958, p. 1771-1775.

(E-general, W19, 18-74; CI)

809-E. Molding Profit Cycle. J. N. Carter. *Modern Castings,* v. 34, Aug. 1958, p. 22-23.

(E16c)

810-E. Foundry Saves $29,448 a Year. *Steel,* v. 143, Oct. 20, 1958, p. 198-199.

New semi-automatic method of core manufacture requires less men, less handling time. (E19)

811-E. (German.) **Sand Preparation on the Foundry Floor.** Werner Riege. *Giesserei,* v. 45, Sept. 11, 1958, p. 587-589.

Advantages of preparing the sand on the foundry floor itself. Problem of sand circuit solved by roller trains, grap buckets, carts, movable belt elevators, movable sand slingers and power lift trucks. Small caterpillar trucks with grap buckets proved to be very useful. (E18, W19h, 18-67)

812-E. (Japanese.) **Properties of Molding Materials at High Temperature. Pt. 5. Stress Caused by Thermal Expansion.** Kunio Futaki and Mitsuo Isotani. *Government Industrial Research Institute, Nagoya, Reports,* v. 7, Aug. 1958, p. 570-576.

4 ref. (E18r)

813-E. (Russian.) **Improving Technology of Melting Alloys in Electric Furnaces.** A. F. Kablukovskii, Ya. S. Leizerov and I. P. Solodikhin. *Metallurg,* v. 3, Sept. 1958, p. 12-15.

Melting of Ni and Fe-base alloys of specific electrical resistance, Nichrome and Fe-Cr-Al alloys. Investigation conducted to reduce high labor expenditure, high spoilage rate and increase annual output. Production of Cr-Al alloy containing no more than 0.03% C and no more than 0.40% Si solved many difficulties. (E10r, Al, Cr, Fe, Vi)

814-E. (Russian.) **New Method of Metal Alloy Preparation.** G. I. Pogodin-Alekseev and V. V. Zaboleev-Zotov. *Liteinoe Proizvodstvo,* July 1958, p. 25-26.

Effect of ultrasonic waves on formation of hard alloys. Relation between changing frequencies of ultrasonic waves and uniformity and hardness of cast alloys. (E25, 1-74)

815 E.* **Design of Cast Components.** H. G. Goyns. *Engineer and*

Foundryman, v. 23, July 1958, p. 54-66.

Mechanism of solidification, shrinkage and cooling stresses in cast steel and cast iron.
(E25n; ST, 5-60, CI)

816-E.* (Russian.) **Effect of Pressure of Inert Gas in Melting Furnaces Upon the Gas Content of Molten Metal.** D. S. Kamenetskaya and A. N. Zelenov. *Metallovedenie i Obrabotka Metallov*, v. 4, Sept. 1958, p. 27-28. (Henry Brutcher, Altadena, Calif., Translation no. 4353.)

Experiments conducted under vacuum and compared with results of inert gas atmosphere, using as test specimen Chromel melted in high-frequency induction furnace, without slag or deoxidizers (magnesite brick lining). By prolonging exposure of liquid metal in inert gas atmosphere, the gas content in the metal declines. By increasing the pressure of inert gases, an increase of gas content takes place.
(E25s)

817-E.* **Austenitic Manganese Steel.** Hedley Thomas. *Castings*, v. 4, Sept. 1958, p. 13, 15, 17, 19, 21, 23.

Techniques employed in an Australian foundry. Melting; ladles and pouring; molds and cores; heat treatment; cleaning of castings; chemical control; physical testing; metallography. Two methods of manganese determination.
(E11; AY, *Mn*)

818-E.* **Radio Isotopes and Their Use in the Foundry.** F. C. Pollard. *Castings*, v. 4, Sept. 1958, p. 25, 27.

Radio-tracer technique and photographic effect; use of beta and gamma rays in determining thickness.
(E-general, 1-59, S14e)

819-E.* **Precision Cast Aluminium Wave Guides.** *Light Metals*, v. 21, Oct. 1958, p. 313-316.

Mercast process for manufacture of wave guide components requiring light weight, extreme accuracy of internal dimensions, dimensional stability, absence of porosity and surface defects, fine surface finish, minimum of costly machining processes, maximum strength.
(E15, X15q; Al)

820-E.* **Use of Oxygen in the Malleable Air Furnace.** *National Cylinder Gas, Information Report*, no. 14, Aug. 1958, 7 p.

O_2 injected into the pulverized coal-air mixture improves combustion, permits rapid oxidation of unwanted elements, improves slag and metal fluidity. (E10s; O, CI-s)

821-E.* **Use of Nitrogen for Flushing Molten Metals.** *National Cylinder Gas, Information Report*, no. 19, Aug. 1958, 8 p.

Advantages of N_2 as degassing, oxide removal agent; procedure, equipment, for eliminating porosity from Al castings.
(E25s, 9-68; Al-b, N)

822-E.* **NCG Controlled Cupola Chemistry Process.** *National Cylinder Gas, Information Report*, no. 13, June 1958, 8 p.

Process for oxygen injection. Advantages claimed include greater output of usable metal, increased alloy recovery, reduced coke consumption, less oxygen consumed.
(E10a; O, CI)

823-E.* (French.) **Cast Steel Chains With High Mechanical Properties.** Maurice Flour. *Fonderie*, no. 150, July 1958, p. 297-301.

Casting techniques and molds used; superiority of cast over welded chain. Suggested that French navy and other users of heavy-duty chain would do well to adopt cast product. (E11, T7e, 17-57; ST)

824-E.* (French.) **Fabrication of Light Alloy Pattern Plates Cast in Plaster Molds.** *Journal d'Informations Techniques des Industries de la Fonderie*, no. 97, June-July 1958, p. 2-7.

Plaster pattern plates formerly used for small-lot manual production were found unsuitable for vibration and pressure conditions of large-lot machine molding. Method was developed for molding light alloy pattern plates directly on plaster master plates having from 20 to 150 very small patterns made of babbitt metal cored into the plaster. Resultant pattern plates are precision products as shrinkage of light alloy is relatively low.
(E19, W19j, 17-57; Al, Mg)

825-E.* (French.) **Central Feeding With Horizontal Cold Chamber Pressure Casting Machines. Molds and Process.** K. A. Ritter. *Machine Moderne*, v. 52, Aug. 1958, p. 71-74.

Tools and techniques which, without requiring any change in mold or machine, permit use on horizontal chamber machines of molds designed for vertical chamber machines. (E13, 1-52)

826-E.* (German.) **Treatment of Aluminum Alloys With Chlorine.** Heinz Scheuten. *Giesserei*, v. 45, Oct. 9, 1958, p. 633-639.

Theoretical discussion of thermodynamic and chemical processes in refining of Al alloys through introduction of chlorine into the melt. Number of possible chemical reactions (with chlorine) is large. Temperature-dependence of reactions can be followed thermodynamically with the Gibbs-Helmholtz equation. Best ways of using chlorine in the gaseous state or as chlorine-releasing salts, for the refinement of Al in the melting process. Excess chlorine may lead to difficult-to-cast metal. 14 ref. (E25s; Al-b)

827-E.* (German.) **Oxygen-Enriched Blast Air in the Cupola Furnace.** *Giesserei-Praxis*, no. 9, May 10, 1958, p. 175.

Advantages: shortening of time between tappings, variable melt temperature, lower coke consumption. Yield increased 3 to 5% by the use of 3-4% additional oxygen.
(E10a)

828-E.* (German.) **New-Type Powder-Flame Cleaning of Castings.** *Giesserei-Praxis*, no. 9, May 10, 1958, p. 176-178.

Cleaning torch combines a fuel-gas-oxygen flame, a current of oxygen and a metallic powder air blast. The Griesheim powder-flame cutter is used in cutting cast iron and steel. Griesheim-powder-lance cleans ingot molds, cuts iron and other alloys as well as slags and refractory materials.
(E24, G22g, L10g)

829-E.* (German.) **Porous Castings Impregnated by the "Moguloid" Process.** *Giesserei-Praxis*, no. 9, May 10, 1958, p. 178-179.

Sealing with Mogul cast seal, a colloidal solution containing metal powder. Before application, the castings are treated by vacuum to remove air from the pores or cavities. Pressure tested at 700 atm., castings sealed by this process resist temperatures up to 400° C.
(E25q, E26, 9-68)

830-E.* (German.) **Spheroidal Graphite Iron.** Karl Kessler. *Industrieblatt*, v. 58, Aug. 1958, p. 363-367.

Heating temperatures and time, as well as cooling conditions, determine resulting properties (ductility, tensile strength, Brinell hardness). Heat treatment used in production of most spheroidal graphite castings. Structures (ferritic, ferritic-pearlitic, pearlitic), and characteristics of each. Welding spheroidal graphite iron, subsequent heat treatment and surface finishing procedures.
(E25q, J-general, K-general; CI-r)

831-E.* (German.) **Progress in the Field of Nodular Cast Irons.** H. Morrogh. *Industrie-Anzeiger*, v. 80, Sept. 12, 1958, p. 20-22.

Pb, Cu, Sb, Bi and Ti, particularly when present in combination, can prevent Mg from having the desired nodulizing effect, but addition of Ce to give a retained Ce content of not less than about 0.002% permits effects of these subversive elements to be neutralized. Use of Ce in presence of Mg is now common practice. (E25q; CI-r)

832-E.* (Swedish.) **Feeding Compounds and Riser Insulation for Steel Casting.** Kurt Beckius. *Gjuteriet*, v. 48, Sept. 1958, p. 127-145.

"Kolfria" (95% silica; 5% oxides of Al, Fe, Ca, Mg and 0.16% P_2O_5), "Kolrika", 18.4-32.3% C; quartz + traces of oxides and metals and mixtures of Al chips, iron oxides, quartz with 0.3 to 1.4% C, or 3.6 to 15.4% respectively, are used in linings surrounding the risers or as a covering on top of the riser, to obtain a thermo-insulating effect that retards solidifying and eliminates piping. 18 ref. (E22q; ST, 9-67)

833-E.* (Dutch.) **Metal-Mold Reaction With Aluminum and Copper Alloys.** H. Boswinkel. *Metalen*, v. 13, June 30, 1958, p. 220-223.

Reaction of molten phosphor bronze or Al alloys containing Mg with the moisture or combined water present in sand molds, and the absorption of the gaseous products by the molten metal. Influence of P, Mg and other alloying elements on the metal-mold reaction and resulting porosity. Effect of pouring temperature, mold temperature and mold material on gas absorption. 10 ref. (E25n, 2-60, 2-61; Al-b, Cu-b, Mg, P, 5-60, 9-68)

834-E.* (Japanese.) **Relation Between Penetration or Blow and Back Pressure of Sand Mold.** Mototaka Mutaguchi. *Japan Foundrymen's Society, Journal*, v. 30, July 1958, p. 541-547.

Mercury used to investigate pressure of penetration or blow and relation between penetration and washes of sand molds. Pressure which caused penetration was inversely proportional to size of sand spacing. Pressure for penetration increased in the presence of back pressure. With back pressure beyond critical range blows occurred regardless of the state of the mold surface. (E19, E11, 3-74; NM-H5)

835-E.* (Japanese.) **Change of Mechanical Properties by Vacuum Melt-**

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

ing of Cast Irons. Pt. 1.** Masao Kikuchi. *Japan Foundrymen's Society, Journal*, v. 30, July 1958, p. 553-559.

Flake graphite existing in each pig iron changed to fine eutectic graphite and the pearlitic matrix became ferritic. Tensile strength in general improved. The use of graphite crucibles increased the carbon in the molten iron and resulted in decreased tensile strength and precipitation of coarse flake graphite. 10 ref. (E10p, M27, Q27a, 1-73; CI)

836-E.* (Japanese.) **Some Experimental Studies of Magnesium Nodular Cast Iron by Reducing Refining in the Electric Arc Furnaces.** Masao Homma, Hiroshi Meguro, Yoshihiko Abe and Reiichi Ohno. *Japan Foundrymen's Society, Journal*, v. 30, Aug. 1958, p. 597-602.

In refining of cast iron in acid and basic electric arc furnaces the amount of Mg was smaller than required in cupola. Both types of furnaces gave excellent desulphurizing actions. Annealed castings from basic furnaces had tensile strengths of 40 to 48 kg. per sq. mm. and elongations of 10 to 15% while acid furnace gave same tensile strengths and elongations of 9 to 11%. 10 ref. (E10r, Q17a, CI-r)

837-E.* (Japanese.) **Relation Between Amount of Binder and Permeability.** Mototaka Mutaguchi. *Japan Foundrymen's Society, Journal*, v. 30, Aug. 1958, p. 608-612.

Factors affecting permeability of molds; formula expressing relationship of permeability with packing binders, sand grain size and percentage of sand grains retained. Results of permeability measurements on green and synthetic sand containing various amounts of binders were in good agreement with computed values. (E18r; NM-f45)

838-E.* (Japanese.) **Studies on Step Gates.** Kenji Chijiiwa. *Japan Foundrymen's Society, Journal*, v. 30, Aug. 1958, p. 612-618.

Fluidity of molten metal in castings to which step gates were attached. Effect of pouring rate and sizes of sprue ingate and casting on fluidity. With fast pouring the molten metal flowed back from the casting to sprue through the upper ingate if the diameter of the ingate was smaller than the sprue. This back flow was prevented by using a sprue diameter that was 80% of the diameter of ingate. If the pouring rate was slow the flow back was negligible when the diameter of the sprue and ingate were the same. (E22p)

839-E. Quality Control of Melting Stock for Investment Founders. L. S. Taylor. *Foundry Trade Journal*, v. 105, Oct. 16, 1958, p. 467-470.

Influence of tramp elements and vacuum melting on the quality of castings. (E10, 1-73, 3-69; ST)

840-E. Protective Atmospheres for Teeming Alloy Steel. P. Holtzhaussen and H. Fiedler. *Iron and Coal Trades Review*, v. 177, Sept. 26, 1958, p. 741-746. (From *Neue Hütte*, v. 2, Nov. 1957, p. 685-691.)

Previously abstracted from original. See item 226-E, 1958. (E23, E25; SS)

841-E. What the Designer Should Know About Production. Pt. 3. Castings, Casting Design, and Foundry Methods. Jack M. Tarnow. *Machinery*, v. 65, Nov. 1958, p. 154-162.

(E-general, 17-51, 17-55)

842-E. Lost Wax Investment Casting. *Machinery (London)*, v. 93, Oct. 22, 1958, p. 941-948.

New precoating material developed for the wax trees, to eliminate "fusion", or "slag spots", which frequently occur when casting Cr alloys of the martensitic type. (E15)

843-E. Use of the NOG Solid Materials Dispensing Unit in the Treatment of Molten Metals. *National Cylinder Gas Information Report*, no. 17, Aug. 1958, 9 p.

Used for injecting $CaCO_3$ or other material for desulphurization, carbon, degassing and deoxidation agents; alloy additions into molten metal. Results in more effective use of additive, better metal agitation. (E25; CI-b)

844-E. Efficiency of a Cupola Furnace. H. Jungbluth. *Giesserei*, v. 43, Apr. 12, 1956, p. 180-184. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 311-E, 1956. (E10, CI)

845-E. (German.) **Molding Box Design.** W. G. Rathmann. *Giesserei*, v. 45, Sept. 25, 1958, p. 623-624.

Difficulties encountered in bolting together cope and drag; proposals to overcome difficulties. (E19, 17-51)

846-E. (German.) **Manufacture and Properties of Foundry Products From Iron-Base Alloys.** J. Goffart. *Industrie-Anzeiger*, v. 80, Sept. 12, 1958, p. 26-28.

(E-general; Fe-b, 5-60)

F Primary Mechanical Working

296-F.* The Extrusion Process. *Precision Metal Molding*, v. 16, Oct. 1958, p. 36-38.

Three general methods in common use are direct, indirect and impact extrusion. Corrosion resistance, machinability and mechanical properties of extrusions. (F24, G5, G17k, Q-general, R-general; 4-58)

297-F.* Designing for Extrusions. *Precision Metal Molding*, v. 16, Oct. 1958, p. 44-47.

Chemistry, physical properties and mechanical properties of nine extrudable Al alloys. (F24, P-general, Q-general; Al, 4-58)

298-F.* Improvement of Welded Structures by Subsequent Forging Operations. W. R. Wollering and E. H. Lundby. *SAE Transactions*, v. 66, 1958, p. 261-266.

Method results in development of physical properties in welded sections of alloy materials approaching those of the wrought parent material. Advantages include weight reduction in dynamically stressed wrought steel assemblies, increase in design factor values, conservation of critical alloy materials. (F22; 7-51)

299-F.* (Rumanian.) **Determination of the Free Spreading of Nonferrous Metals When Rolling by Noncalibrated Cylinders.** R. Miculescu, S. Bercu and I. Dragan. *Studii si Cercetari de Metalurgie*, v. 1, Jan-June 1956, p. 107-117.

In order to set up formulas and nomograms enabling the rolling operator to calculate the magnitude of spreading of metals during the rolling, a whole series of experiments were made, which herein are given in the form of tables. As a result of the comparative study between nonferrous metals and steel, it has been found that the same factors determine decisively the magnitude of the spreading during the rolling. The authors also have established a formula by which one can determine analytically the magnitude of the spreading in the case of rolling of these metals. For aluminum, it has not been possible to find a general formula, but it has been established that this metal presents a more pronounced spreading in function of the reduction of height in comparison with the spreading of the copper or of the brass. 3 ref. (F23; Al, Cu)

300-F.* (Rumanian.) **Investigation of the Conditions of Adhesion in Rolling.** R. Fischgold. *Studii si Cercetari de Metalurgie*, v. 1, Jan-June 1956, p. 119-147.

Attempt to give a quantitative and qualitative appreciation of the reserves of friction forces existing during the transition from the initial moment of contact to the stabilized process by assuming for basic index the ratio $K = \frac{\alpha_{II}}{\alpha_I}$ (α_I being the angle of initial contact and α_{II} the contact angle in the stabilized phase of the rolling process). This coefficient is a function of the following factors: rolling temperature, nature and composition of the metal rolled, complexity of the rolling scheme, conditions of friction on the contact surface between the deformed metal and the cylinders. The coefficient K decreases as the rolling temperature rises, according to an almost linear relation. There is a pronounced decrease of the friction angle ψ_{II} in comparison with ψ_I in the case of hot rolling; for the cold rolling the value of ψ_{II} is considerable closer to that of ψ_I. 9 ref.

301-F.* High Production Flat Rolling. C. S. Ball and C. W. Starling. *Sheet Metal Industries*, v. 35, Oct. 1958, p. 767-774.

Integrated steelworks and continuous hot strip mill is an extremely complicated organism. Such a process may eventually break down because of its own complexity. Basic trends in the development of steel production and hot rolling are the direct manufacture of steel from ore; the direct manufacture of hot rolled sheet from pig iron and the development of the conventional sequence of blast furnaces, melting and refining furnaces—casting to solid form—hot rolling. 5 ref. (F23, W23c)

302-F. Factors Influencing the Accuracy of the Rolling of Sheet and Strip and Their Control by Experiment and by Calculation. O. Emicke and K. H. Lucas. *Neue Hütte*, v. 1, 1956, p. 257-274. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 150-F, 1956. (F23, W23c)

**303-F. Calculation of Cooling Characteristics of Barstock on Cooling

Beds and the Suitability of Certain Cooling Bed Designs for Material of Different Compositions and Profiles. Paul Gruner. *Draht (English Edition)*, no. 36, Aug. 1958, p. 19-26.

Factors facilitating and impeding heat exchange and cooling are summarized. (F21; 5-59, ST)

304-F. Liquid Slag Removal From Soaking Pits. Stukalov. *Stal'*, v. 17, no. 2, 1957, p. 169-173. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

(F21b, W20g; RM-q)

305-F.* Semi-Continuous Hot-Strip Rolling With Automatic Programme Control. A. Hegarty. *Sheet Metal Industries*, v. 35, Aug. 1958, p. 623-625.

New 44-in. mill rolls over 100,000 tons of coiled strip steel per month. Strips of varying gages and up to 40 in. wide are produced for pipe mills. Automatic control, using punched card, offers maximum utilization of equipment and greater uniformity of product.
(F23, 1-61, 18-74, W23c; ST)

306-F.* (German.) **Properties and Manufacture of Aluminum Wire.** H. D. Feldmann. *Aluminium*, v. 34, Sept. 1958, p. 530-537.

Materials used in production and mechanical properties of rolled, extruded and cold drawn wire. Mechanical and electrical properties degraded by excess of Si. Influence of heating before rolling.
(F28, Q-general, P15; Al, 4-61)

307-F.* (German.) **Manufacture of Aluminum Pipe by High-Frequency Resistance Welding.** *Aluminium*, v. 34, Sept. 1958, p. 540-543.

"Thermatool" method applied in welding preformed Al pipe, using high frequency. Advantages of heating only a thin surfacial layer. Other applications: welding of cold and hot rolled steel, tin-plated sheet, copper, brass; cable sheaths.
(F26p, K3; Al, ST, Cu)

308-F. Servo-Control of Strip Thickness in Rolling Mills. P. R. A. Briggs. *Automation Progress*, v. 3, Aug. 1958, p. 291-293, 297.

System in which elastic deformation of rolling mill itself and screw position of rollers is measured and corrected for temperature changes, allowing strip thickness to be computed. (F23q, W23c, S14b)

309-F. Electromagnetic Control of Rolling Mill Machinery. A. Asbury and H. Law. *Automation Progress*, v. 3, Aug. 1958, p. 294-297.

(F23q, W23c, 18-74)

310-F. Extrusion. *Metal Industry*, v. 93, Oct. 3, 1958, p. 271-273.

Discussion of papers presented at the Institute of Metals Autumn Meeting. (F24, G5)

311-F. Forging-Quality Steels. *Metal Treatment and Drop Forging*, v. 25, Sept. 1958, p. 385, 386.

Refining, casting ingots, segregation, surface treatments. (F22; ST)

312-F. Titanium Wire and Extrusions. J. R. Crane. *Wire Production*, v. 7, Apr-June 1958, p. 7.

Drawing and extrusion techniques.
(F24, F28; Ti, 4-61)

313-F. Some Problems Arising During Investigation of the Extrusion Forces When Extruding Circular Full Shapes From Aluminum and Aluminum Alloy Through Single Multiple Aperture Dies. I. Kochish. *Acta Teknika, Academiae Scientiarum Hungaricae*, v. 15, 1956, p. 381-419. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB61.)

Previously abstracted from original. See item 232-F, 1956.
(F24; Al)

314-F. Calculation of Pressures Required in the Extrusion of Light Metal Shapes. H. Hornauer. *Aluminium*, v. 36, 1956, p. 350-356. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1483.)

Previously abstracted from original. See item 157-F, 1956. (F24; Al)

315-F. (French.) **Ugine-Sejournet Process for Hot Extrusion of Steel.** G. Leclerc. *Technique Moderne*, June 1958, p. 243-248.

8 ref. (F24; ST)

316-F. (German.) **Systematic Classification of Deformation Operations. Pt. 2.** W. Engelhardt. *Fertigungstechnik*, v. 8, Sept. 1958, p. 418-422.

(F-general, G-general, Q-general)

317-F. (Russian.) **Automation of Tube Rolling Mills.** I. G. Mindlin. *Metallurg*, v. 3, Sept. 1958, p. 29-31.

First fully automated tube mill in the USSR turns out tubes with diameter from 170 to 350 mm. for use in oil wells, machine building, coal mining and electric power stations. (F26s, W23h, 18-74)

318-F. Development of Practices for Commercial Production of Titanium and Titanium Alloy Wire. Driver Harris Co., Harrison, N. J. *U. S. Office of Technical Services*, PB 126530, June 1955, 34 p. (Available at Library of Congress, Washington, D. C.—Microfilm $3; Photostats $6.30.)

(F28; Ti-b)

319-F. Development of 650 Pound Billets of 3% Al-5% Cr-Titanium Alloy. S. S. Smith, Jr. Menasco Manufacturing Co. *U. S. Office of Technical Services*, PB 127147, Mar. 1955, 8 p. (Available at Library of Congress, Washington, D. C.—Microfilm $1.80; Photostats $1.80.)

Purpose of the work was to successfully manufacture four forging billets for landing gears.
(F23n, F22; Ti-b)

320-F.* How Alloying Elements Affect Steel Forgeability. G. P. Contractor and W. A. Morgan. *Iron Age*, v. 182, Nov. 13, 1958, p. 142-146.

Forgeability of various steels measured by number of twistings to failure at temperatures between 1900-2500° F. is strongly affected by C, Mn, S, Ni, Si and Cr, less so by Pb and N. O, P, Co, V and Ti have little effect.
(F22, 17-52; ST, SS)

321-F.* (Czech.) **Flattening of Sheet Metal.** Jindrich Matas. *Zvaranie*, v. 7, July 1958, p. 219-220.

Flattening of uneven spots by heating the convex side. For 1 to 3-mm. sheet metal, use of an oxy-acetylene torch suggested, together with a circular steel plate through which compressed air passes, to heat an area of only 9 mm. diameter while the rest of surface is cooled. Sheet metal under 1 mm. can be resistance heated by passing a wedge-pointed carbon electrode (negative in the case of d-c.) over the surface. (F29s)

322-F.* Three New Ways to Make Precision Forgings, Extrusions. John F. Murphy. *Materials in Design Engineering*, v. 48, Nov. 1958, p. 105-107.

Rotary press forging, precision gear forging and cross extrusion provide close tolerances without machining as well as parts of high strength. Specific applications of these processes. (F22, F24, 1-52)

323-F.* Some Limiting Factors in Extrusion. S. Hirst and D. H. Ursell. *Metal Treatment*, v. 25, Oct. 1958, p. 409-413, 416.

Limitations on the extrusion ratio imposed by the dimensions and preheat temperature of the billet for any given press capacity may be expressed in the form of a family of curves on a graph of extrusion ratio against preheat temperature. Extrusion ratio is also restricted by unacceptable temperature rise due to heat input and this limitation can be expressed on the same graph, thus defining an enclosed area in which extrusion is possible for any given conditions. (F24)

324-F.* Metallurgical Examination of Forging-Quality Steels. J. D. Bunton. *Metal Treatment*, v. 25, Oct. 1958, p. 414-416.

Factors affecting forgeability include piping, excessive segregation, heavy stringers and corner weakness. Properties in a steel to insure satisfactory hardenability and machinability. (F22, G17k, 17-52; ST)

325-F.* Processing of Wrought Steel to High Strength. L. H. McCreery. *SAE Journal*, v. 66, Oct. 1958, p. 70-74.

Processing of 4340 steel is feasible if steel used has the capability to be heat treated to high strength with significant ductility; rolling or forging process is performed in a quality manner with no overheating or burning; machining processes are performed carefully and completely; heat treatment used is completely adequate as to process, times and temperatures. (F22, F23; AY)

326-F.* Processing Wrought Steel to High Strength. L. H. McCreery. *Society of Automotive Engineers*, Preprint no. 82B, 1958, 19 p.

Heat treatment, rolling, forging machining and finishing operations.
(F-general, G-general, J-general; ST, SGB-a)

327-F.* How to Forge Molybdenum. *Steel*, v. 143, Nov. 3, 1958, p. 84-86.

Remedies for the following problems: high-impact velocity needed to begin plastic flow; oxidation; loss of control of furnace temperature.
(F22; Mo)

328-F.* (Russian.) **Main Reasons for Variations in Thickness of Hot Rolled Strip Produced in Continuous Rolling Mill.** P. I. Grudev. *Stal'*, v. 18, Sept. 1958, p. 813-817.

The elimination of gage variations may be achieved by providing for automatic displacement of mill screwdowns, depending on length, and consequently on temperature, of rolled strip. To prevent the influence of incidental factors on strip thickness it is advisable to use metal pressure on rolls as signal, initiating displacement of the mill screwdowns. (F23, 1-66, 1-61; ST)

329-F.* (Russian.) **Mastering the Technique of Rolling Heavy Plate According to Theoretical Weight.** I. D.

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

Kuzemka. *Stal'*, v. 18, Sept. 1958, p. 817-820.

Allowances calculated in conformity with a special method; rational roll design with reduction of roll wear (plus deflection); regular control of plate thickness and roll profile during rolling, with corresponding adjustment of thickness allowances where needed.
(F23, W23b, 17-51)

330-F.* (Russian). **Influence of Metal Structure and Mechanical Properties of 08 KP Steel on Its Forgeability.** B. S. Natapov and D. E. Tsivirko. *Stal'*, v. 18, Sept. 1958, p. 828-834.

Investigation to establish relationship between the physico-mechanical properties of sheet steel as determined in laboratory tests and its performance during forging. Main reasons for rejected forgings during deep drawing are the gross metallurgical flaws, reduced ductility and increased metal stiffness, as well as failure to observe correct methods during drop forging. To improve properties of sheet steel it is necessary to decrease its yield point and increase uniformity of sheet. 12 ref.
(F22n, 17-52, G4b; ST, 4-53)

331-F.* (Russian.) **Durability of Diamond Drawholes for Micron Size Wire.** G. P. Gvosdyk and N. F. Andrianov. *Stal'*, v. 18, Sept. 1958, p. 839-842.

Durability is greatest where the metal is purest (free of inclusions) and where the annealing temperature of ingots is high (to 1050°). The thinner the diameter of the wire and the greater the drawing speed, the greater the durability of drawholes. Durability is considerably lower during first draws, and with increase in number of draws and in speed, the durability increases. It is greater when the pressure is lower (but that necessitates a greater number of drawholes). (F28, W24k; NM-k37)

332-F. Metallurgy of Electric Resistance Welded Steel Pipe. J. Gordon Parr. *Canadian Mining and Metallurgical Bulletin*, v. 51, Oct. 1958, p. 624-629.

Effect of mill variables on the metallography of welds as it is affected by variations in heat input, mill speed, pipe contour, edge condition and steel defects.
(F26p, K3, M27; SS)

333-F. Hot-Cold Forming Boosts Quality, Prunes Costs. *Steel*, v. 143, Nov. 3, 1958, p. 72-74.

Combination hot cup, cold draw process for 8-in. howitzer shells.
(F22, G4, 1-66, 1-67; CN)

334-F. Rotary Forging Turns Profits Up. *Steel*, v. 143, Nov. 10, 1958, p. 122-123.
(F22, W22r)

335-F. Hot Roll Forms Titanium. *Steel*, v. 143, Nov. 17, 1958, p. 114.
(F23; Ti-b)

336-F. (German.) **New Extrusion Methods.** *Aluminium*, v. 34, Sept. 1958, p. 538-539.

Short survey: Use of hydraulic presses for extruding steel; new type hydraulic press for high-speed extruding; new press for cable sheathing with Al.
(F24, W24g; Al, SS)

337-F. (German.) **Deformation Rate in Hot Rolling.** Zygmunt Wusatowski. *Neue Hütte*, v. 3, Aug. 1958, p. 494-497.

Derivation of a relation for the deformation rate during rolling. 5 ref. (F23)

338-F. (German.) **Nomographs Based on S. Ekelund's Equation on the Forces Effective in Rolling.** Alfred Mathea. *Stahl und Eisen*, v. 78, Oct. 2, 1958, p. 1383-1389.

Nomographs aiding in computation of forces for heavy and light plate rolling. (F23, U4q)

339-F. (German.) **Forces Effective in Die Forging.** H. Lippmann and F. Neuberger. *Werkstattstechnik und Machinenbau*, v. 48, Aug. 1958, p. 449-452.
(F22)

340-F. (Polish.) **Analysis of the Trend in Expansion of Tube Rolling Plants in Poland.** Wladyslaw Dobrucki. *Hutnik*, v. 25, June 1958, p. 195-201.

Polish production of gas, industrial, drilling, boiler and construction pipe. Statistical data. Forecast of pipe requirements of Polish industry for the next three years.
(F26s, W23h)

341-F. (Polish.) **Experimental Investigation of Rolling.** Joachim Jonca and Jerzy Rabalski. *Hutnik*, v. 25, June 1958, p. 201-206.

Determination of magnitude of rolling momentum, of pressure exerted by the rollers, and of power demand of a rolling mill. Measurement of the rolling process. (F23)

342-F. (Polish.) **Prospects of Expansion of Production of Tubes With Seams.** Zygmunt Korek. *Hutnik*, v. 25, June 1958, p. 206-210.

Survey of steel pipe production in Poland. Welding of pipe with different seam requirements. Cost analysis of different processes of pipe production. Economical advantages of production of seamed pipe. 4 ref.
(F26p; ST)

343-F. (Russian.) **Determination of Machine Time for Rolling Thin Sheet With Doubling.** Sh. A. L'vovskii. *Stal'*, v. 18, Sept. 1958, p. 821-823.
(F23, A5; 4-53)

Secondary Mechanical Working

Forming and Machining

526-G.* Impact Extrusion of Steel Wrist Pins. *Precision Metal Molding*, v. 16, Oct. 1958, p. 40-42.

Steel used is AISI 5015, cold drawn and annealed. Billets are phosphate coated and lubricated with a soap-like material and then extruded. Web removal, hardening and grinding follow the extrusion process. (G5, T21b; ST)

527-G.* Eliminating Edge Breaking by Ultrasonic Cutting. Burton B. Stuart. *Grinding and Finishing*, v. 4, Aug. 1958, p. 34-35.

Ultrasonic cutting head mounted on new-design suspension system cuts brittle ferrites, semiconductor materials with sharp corners, low reject rate. (G24d; EG-j31)

528-G.* Oxy-Gasoline Cutting Torch Works Fast, Lowers Cost. William Czygan. *Iron Age*, v. 182, Oct. 23, 1958, p. 66-67.

A new flame torch cuts through ½ in. steel at 30 ips. on just 12 cc. of gasoline and 48 liters of oxygen. Savings result in fuel, reduced labor, storage and handling costs. There is little or no slag left. (G22g)

529-G.* Completely Carbide. C. R. Morgan. *Automatic Machining*, v. 19, Oct. 1958, p. 37-39.

Carbide can increase production on turret lathes and similar chucking-type turning machines so the advantage should be multiplied on single and multiple-spindle automatics, where many tools are employed, and where tool tending time is a major factor in production costs. (G17a; SGA-j, 6-69)

530-G. Draw Die Forms Tapered Parts. Charles Myers. *Iron Age*, v. 182, Oct. 9, 1958, p. 86-87.

A 259-in. tapered strip drawn into complex cross section by using die with movable segments, controlled by part thickness. (G4, W24n, 1-52)

531-G. Electro-Chemical Machining. *Machine and Tool Blue Book*, v. 53, Oct. 1958, p. 129-132, 134.
(G24d)

532-G. Faster Hobbing of Gears With More Accuracy. A. Budnick. *Metalworking Production*, v. 102, Sept. 26, 1958, p. 1686-1689.
(G17b, T7a)

533-G. Trends in Gear Cutting and Finishing Processes. A. Sykes. *Metalworking Production*, v. 102, Sept. 26, 1958, p. 1692-1694.
(G17g, T7a)

534-G. (French.) **Manufacturing Precision Telescope Parts.** A. Blanken. *Machine Moderne*, no. 592, July 1958, p. 17-19.

In the manufacture of precision parts, telescopes are used as alignment instruments, allowing measurements within 0.02 mm. Finish machining and testing of telescope tubes. (G17, X3)

535-G.* Pivot Polishing. Walter I. Shanler. *Automatic Machining*, v. 19, Oct. 1958, p. 40-43.

Small precision part is accurately sized (for both diameter and shoulder lengths) and is given an extremely fine surface finish on a practical basis. Pivot superfinishing is a chip removing operation somewhat related to cylindrical grinding. The grinding wheel itself is replaced by a specially ground carbide or ceramic superfinishing wheel. (G19q)

536-G.* Hot-Sizing Titanium Shapes at Ryan Aeronautical Co. Charles O. Herb. *Machinery*, v. 65, Oct. 1958, p. 122-124.

Use of hot dies and stretch forms insures accurate shape and size of parts made from commercially pure Ti and alloys that are hard to form.
(G9, 1-52: Ti)

537-G.* Slicing and Dicing Crystals of Silicon and Germanium. *Machinery*, v. 65, Oct. 1958, p. 128-130.

Si and Ge crystals for application in military, airborne and industrial electronic systems and controls are produced. Methods developed for mass-producing these parts to dimensions of 0.035 in. square by 0.013 in. thick within a tolerance of ± 0.002 in. (G17; Si, Ge)

538-G.* Hot-Sizing Titanium and Heat-Resistant Steel Parts. *Machinery (London)*, v. 93, Oct. 1, 1958, p. 762-764.

It is difficult to produce small corner radii in such metals, and when parts have been formed in

hydraulic presses, or by drop-hammers, they almost invariably have wrinkled flanges and warped surfaces. To overcome these difficulties, several prototype hot sizing presses have been developed. On these machines, parts are hot sized in less than 8% of the time formerly required for bench working, and dimensional limits of the order of ± 0.003 in. can be maintained. (G9, 1-52; Ti, SS)

539-G.* **Glass Lubricants in Metallurgy.** L. K. Kovalev and V. A. Ryabov. *Metal Industry*, v. 93, Sept. 26, 1958, p. 249-251. (From *Steklo i Keramika.*)

Glass lubrication is being used increasingly in metalworking, particularly in hot pressing, stamping, boring and in the hot shaping of high-alloy steels, Mo, V, Zr and Ti. (G-general; NM-h, NM-f43)

540-G.* **Cold Heading and Upsetting.** G. H. Townend and F. B. Wilson. *Metal Treatment and Drop Forging*, v. 25, Sept. 1958, p. 353-359.

Methods and machines for production of cold headed parts; suitable materials. Process is widely used in manufacture of fasteners; small bolts, for example, at the rate of 200 per min. The most commonly used material is carbon steel. (G10, 1-67, T7f; CN)

541-G.* **Precise Methods Make Transistor Elements.** Charles Emerson. *Metalworking Production*, v. 102, Oct. 10, 1958, p. 1789-1790.

Ultra-small pieces of Ge, Si and other semiconductor materials are machined and finished with careful laboratory techniques. Improved methods of cutting and finishing the unusual materials, which are hard and brittle, include slicing thin wafers from a single-crystal ingot with diamond saws; dicing the wafers into tiny squares of material with a single or ganged saws; lapping and polishing the faces of the wafers and dice to a high accuracy; ultrasonic machining faces to special shapes. (G17, T1k; Ge, Si, EG-j)

542-G.* **Gun Drilling Solves Concentric Cavity Machining Problem.** *Modern Machine Shop*, v. 31, Nov. 1958, p. 150-152.

The part to be drilled was a small disk of cold rolled steel with Zn plating. It required a concentric cavity with 45° sides. A solid carbide-tipped gun drill, 7 in. long, was made with the carbide point sharpened to fit the contours of the depression in the disks. This took advantage of the characteristics of all gun-type tools; free cutting at minimum end pressure, designed to cut to center and use of hard grade of carbide. (G17e; ST)

543-G.* **Ultrahigh Speed Machining. Solution to Producibility Problems?** Robert L. Vaughn. *Tool Engineer*, v. 41, Oct. 1958, p. 71-76.

Need for new machining methods for aircraft parts; machining variables; reasons for metal failure; plastic deformation in solids; results of experiment with explosive machining at 150,000 ft. per min. were favorable. (G17, G19)

544-G.* **Power-Roll Forming: Machining Without Chips.** John N. Heater. *Tool Engineer*, v. 41, Oct. 1958, p. 99-102.

Power-roll forming, also called hydrospinning, floturning, flow forming and power spinning, is a fast and accurate method of forming cones, tubes and other shapes. Characteristics and applications of the process as well as basic theory. Chipless machining is possible with this process, which forms parts to close tolerances by rotary extrusion. (G11, G13)

545-G.* **Evaluating the Producibility of Cold-Extruded Parts.** R. W. Gardner. *Tool Engineer*, v. 41, Oct. 1958, p. 105-107.

When producibility considerations are taken into account, the ability of the cold extrusion process to shape parts to finished dimensions with few secondary operations can be fully exploited. Points which are important in considering cold extrusion of steel as a manufacturing process are tool design, product geometry or shape, product material and lubrication. Thus, depending upon conditions, cold working is either an advantage or a disadvantage. (G5)

546-G.* (Japanese.) **Forming Gears on Rotary Hot Presses.** M. Naruse. *Metals*, v. 28, Sept. 1958, p. 683-691.

Uncut wheel is heated by high-frequency heater, which consists of circular coil for preheating and of quadrant coils for the working process. Rim of a wheel is heated by 400 kc. alternating current. (G17g)

547-G. **Metallic Carbide Tools.** G. Villani. *Revue Mecanique*, v. 7, no. 130, 1956, p. 27-33. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1430.)

(G17, T6r, 6-69)

548-G.* **Machining Operations on Honeycomb Material.** *Machinery (London)*, v. 93, Oct. 15, 1958, p. 903-906.

The honeycomb core is attached to a skin or "caul plate" with polyethylene glycol, a water-soluble wax-like material which has excellent gripping properties at room temperature but can be melted and removed from the work by washing in hot water. To machine the honeycomb, a "truck-valve" type of cutter is used. A manually controlled Wadkin router, with a 25-ft. long table; planer-type machine for producing wedge-shaped honeycomb parts. (G17, 7-59)

549-G.* (German.) **Thread Rolling.** Karl Schimz. *Werkstatt und Betrieb*, v. 91, Sept. 1958, p. 538-544.

Rolling with flat tools, with driven round tools, and with nondriven tools. Changes in material and its properties, suitability of different materials, accuracies obtainable, quality of surface finish, economy of the single methods. 12 ref. (G12)

550-G.* (German.) **Thread Skiving.** Ernst Linsinger. *Werkstatt und Betrieb*, v. 91, Sept. 1958, p. 545-550.

To calculate the cutting data in thread skiving a simple formula is given for the "Komma-factor", the ratio of the peripheral feed to the maximum thickness of chips. Output investigations based on the volume machined in the time unit, to the choice of the driving motor, the influence of the specific cutting power, choice of the cutting angle, construction of tools, down-cut or climb-cut operations, respectively, demands on the lathe to be used, questions of cooling, the choice of the cutting speed for different materials. (G17f)

551-G.* (German.) **Strip Drawing Operations.** J. Thorwarth. *Werkstatt und Betrieb*, v. 91, Sept. 1958, p. 572-577.

Follow-on drawing operation for parts having a large diameter, developed from the Oeillet method. Theoretical fundamentals, calculation of a tool for drawing in the single-row strip; comparison of costs with individual drawing method; drawing in multiple-row strips and with freely cut sheet or bars. 5 ref. (G4)

552-G.* (Japanese.) **Behavior of Chips in Steel Cutting.** K. Okushima and K. Minato. *Japan Society of Mechanical Engineers, Transactions*, v. 142, no. 24, 1958, p. 333-339.

Flow-out angle of chip and shape of chip studied for various cutting speeds, thrust and nose radius. Effects of the first two are not appreciable, but the larger the nose radius, the larger the flow-out angle. Chips are classified into the continuous type and the chop type. (G17; ST)

553-G.* (Japanese.) **Researches on Grinding Fluids.** R. Furuichi and Y. Tanaka. *Japan Society of Mechanical Engineers, Transactions*, v. 142, no. 24, 1958, p. 340-345.

Various emulsion-type grinding fluids based on spindle oil studied under various grinding ratios, tangential grinding force, the wearing state of the grinding wheel and the rate of dilution of the grinding fluid. Vacuum annealed spring steel is used as a test sample. Additives to the fluid are rape-seed oil, paraffin chloride and tri-cresyl phosphate. With the increase of the rate of dilution of the fluid, the grinding ratio decreases and the tangential grinding force and the wearing rate of the grinding wheel increase. (G18; NM-h)

554-G. **Carbide Versus Carbide.** Robert T. Hook. *Automatic Machining*, v. 19, Oct. 1958, p. 45, 46.

After a seven-year study, a company is using premium grade carbide in turret lathes, thus increasing their speed of production with no increase in wear, resulting in a $68,000 saving. (G17a; 6-69)

555-G. **Oxides at Oldsmobile.** *Automatic Machining*, v. 19, Oct. 1958, p. 51-53.

Two production machining operations employing oxide tools are finish turning brake drums and semi-finish turning camshaft bearings. Advantages of using oxide tools and operating data. (G19q; 6-70)

556-G. **High-Speed Piercing Method Slashes Short-Run Costs.** E. J. Egan, Jr. *Iron Age*, v. 182, Oct. 23, 1958, p. 73-75.

New 20-turret punch press, which is fast, flexible and safe, speeded up production of vending machine parts. (G2j, W24p)

557-G. **Machining the "Supermetals".** *Mill and Factory*, v. 63, Sept. 1958, p. 115.

Higher speeds and throw-away cutters have reduced time and tool breakage in machining "superalloy" steels and greatly improved the quality of aircraft and missile parts. (G17, W25r; SS)

558-G. **Effects of Operating Variables on Abrasive Belt Life.** J. M. Pitblado. *Tool Engineer*, v. 41, Oct. 1958, p. 113-116.

(G18, W25c)

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

559-G.* (German.) **Electric-Discharge Machining of Tools.** Hans Joachim Schulz. *Giesserei*, v. 45, Sept. 25, 1958, p. 615-623.

Describes set-ups for producing spark energy and for adjusting distance between work and tool electrode; method of operation of modern electric-discharge machine tools. Method for determining shape of tool electrodes; methods for manufacture of spark-machining tools and the electric-discharge engraving of a die. Examples of operation of process; economy of the process. 12 ref. (G24a; TS)

560-G.* **Natural Gas for Cheaper Cutting.** William J. Semple. *American Machinist*, v. 102, Aug. 25, 1958, p. 69-71.

Purpose of the tests was to ascertain which type and make of equipment, operating on either natural gas or acetylene, would give the lowest total cost for oxygen cutting while maintaining satisfactory quality. Test setup and procedure; results with the aid of graphs. (G22g; RM-m35)

561-G.* **Types and Properties of Cutting Fluids. Pt. 1.** E. L. H. Bastion. *Canadian Metalworking*, v. 21, Oct. 1958, p. 16, 18, 20, 22, 24, 26.

Historical outline; performance and service properties. Where cooling is the most important requirement, the emulsion or water-based solution is best. High-carbon and hard alloy steels are best machined with chemically active oils containing sulphurized fatty oils. For machining tough, "stringy", low-carbon steel, straight, sulphurized mineral oils are used. In machining tough, ferrous alloys chlorinated or sulphochlorinated oils perform well. (To be continued.) (G17; NM-h)

562-G.* **How Roll Flowing Works. Pt. 2.** Richard E. Paret. *Metal Forming and Fabricating*, v. 20, Oct. 1958, p. 27-28.

Roll flowing produces parts to a predetermined shape by the cold flowing of metal over a mandrel. Blank development and proper balancing of roller pressure and feed are the most important factors. (G13)

563-G.* **Ceramics Prove Themselves on Copy Turning.** *Metalworking Production*, v. 102, Oct. 17, 1958, p. 1820-1821.

A standard copying lathe with a larger motor provides faster cutting speeds and longer tool life with the use of ceramic tools. Properties of ceramic material compared with those of carbide. Ceramic tip holders. (G17a; T6n, 6-70)

564-G.* **Grinding Space Age Materials.** John A. Mueller. *Tool Engineer*, v. 41, Nov. 1958, p. 127-128.

Grinding specifications for silicon carbide, alumina, Zr and Mo. (G19; Si, 6-69, Al, 6-70, Zr, Mo)

565-G.* (German.) **Progress in Machine Finishing, Finishing Lathes and Finishing Drills.** Hermann Schopke. *Industrieblatt*, v. 58, Aug. 1958, p. 333-338.

Procedures and machinery used for surface finish of cylindrical bodies, both inside and outside. Definition of terms; construction and function of horizontal and vertical inside-finishing lathes, horizontal and vertical outside-finishing lathes, multiple spindle machines; profile drill; spindle units, special machines, transfer routes. Fine machining of outer surfaces by ordinary production machinery. (G17a, W25)

566-G.* (German.) **Lapping in Modern Finishing.** Wilhelm Schmid. *Industrieblatt*, v. 58, Aug. 1958, p. 338-341.

Lapping, developed originally to remove very thin surface layers in finishing operations, has gained new importance for other procedures; by careful selection of abrasive grains and proper combination of lapping compounds, it is now possible to remove considerable amounts. Thus, lapping can replace other procedures like grinding, in some cases even milling. The advantage of lapping is better surface quality at the end of operations. Lapping methods, available machinery and most important lapping compounds discussed. Reference is made to the recently developed "beam-lapping". (G19p)

567-G.* (German.) **Drilling With Hard Metal Tools.** Hermann Hardt. *Industrieblatt*, v. 58, Oct. 1958, p. 419-424.

Use of hard-metal tools is no longer restricted to turning, planing and milling, but includes other procedures like drilling and boring. "Spiral drill" as well as a number of drills for special application. Influence of material to be drilled, characteristics of drills, length of time before resharpening, chip removal, accuracy obtained, energy consumption, working speeds, lubrication. Problems encountered in drilling. Suggestions on use of hard-metal cutting tools to best advantage. (G17e, T6n; SGB-q)

568-G.* (German.) **Protruding With Punch (Sheet Metal Work).** R. Wilken. *Werkstattstechnik und Maschinenbau*, v. 48, Aug. 1958, p. 413-420.

Flow of material, effective stresses, most suitable shape of punch, forces necessary for various tools and materials. Size and shape of protruded portion. (G2j)

569-G.* (Italian.) **Factors That Influence Surface Finishes.** Carlo Rosini. *Rivista di Meccanica*, v. 9, June 21, 1958, p. 19-26.

Factors in production of acceptable surface finishes include type of machining operation and machine tool used, tool characteristics, feed, depth of cut, speed, lubricant, characteristics of workpiece. (G17)

570-G.* (Italian.) **Plastic Working of Sheet Steel. Pt. 2. Bending.** Riccardo Levi. *Rivista di Meccanica*, v. 9, July 19, 1958, p. 19-24.

Calculation of development of bends; lengthening and loss of thickness of bent fibers; displacement of undeformed fiber (neutral axis) from centerline of material thickness toward center of curvature; other phenomena associated with bending; bending tests. (G6; ST, 4-53)

571-G.* **Forming Metals at High Velocities.** T. C. DuMond. *Metal Progress*, v. 74, Nov. 1958, p. 68-76.

Capabilities, limitations, 11 different methods of explosive forming. Types of metals to which applied. (G-general; NM-k34)

572-G. **Tooling and Technique Build 880 Jets.** George H. DeGroat. *American Machinist*, v. 102, Aug. 25, 1958, p. 84-87.

An outstanding technique for assembly, which combines adhesive bonding and riveting, was developed to make the wings leakproof and to increase strength and resistance to fatigue. (G17, T24a; Al-b)

573-G. **Chrysler Machines With Job-Tested Oxides.** Ben C. Brosheer. *American Machinist*, v. 102, Nov. 3, 1958, p. 108-113.

Cutting speeds, tool life and quality control were improved compared with carbide bits. (G17, T6w; SGA-j)

574-G. **Ceramics for Machine Tools. Pt. 2.** R. M. Gill and G. Spence. *Ceramics*, v. 9, Sept. 1958, p. 27-31.

Applications, advantages and limitations of modern oxide ceramic tooling in relation to mild steel, cast iron, gear steel and toolsteel. (G17, T6n; 6-70, CI, CN, TS)

575-G. **Description of Electrolytic Jet Etching of Silicon.** Albert Mark. *Electrochemical Society*, Abstract no. 72, May 1957, p. 165-169.

Holes are drilled into Si crystals by high-pressure liquid stream in lieu of a conventional metal drill. (G24b; Si)

576-G. **Tool Steel Failures.** G. Davitz. *Engineer and Foundryman*, v. 24, Aug. 1958, p. 63-70.

Causes of tool failure which can be avoided by proper choice of steel, correct heat treatment, good design, proper grinding. (G17, S21; TS, 17-57)

577-G. **Cold-Working Relieves Weld Stress, Eliminates Metal Removal.** H. L. Meredith. *Industry and Welding*, v. 31, Oct. 1958, p. 76-77, 86.

(G23, F29a; Al-b, 7-51, 3-66, 4-60, 3-74)

578-G. **Hot-Cup Cold-Draw Process Forms to Tight Dimensions.** R. O. Schulin. *Iron Age*, v. 182, Nov. 6, 1958, p. 110-112.

Artillery shells formed in two-step operation to closer tolerances, better surface finish. Labor, material costs cut. (G4, F22, T2j)

579-G. (Italian.) **Plastic Working of Sheet Steel. Pt. 2. Bending.** Riccardo Levi. *Rivista di Meccanica*, v. 9, July 5, 1958, p. 27-33.

Machines and accessories used for bending operations; feeding attachments; safety measures. (To be continued.) (G6, W24, A7p; ST, 4-53)

580-G. **Special Techniques Help Lick Complex Stainless Shapes.** R. H. Eshelman. *Iron Age*, v. 182, Nov. 13, 1958, p. 135-137.

Suggestions for special handling, machining, inspecting of difficult shapes made of high-strength material. (G17; SS)

581-G. **Investigation of the Theories of Orthogonal Machining.** Tomuya Ota, Akio Shindo and Hidekazu Fukuoka. *Japan Society of Mechanical Engineers, Transactions*, v. 24, July 1958, p. 484-493.

7 ref. (G17)

582-G. **Titanium, Improved Spotwelding, Forming and Tooling Techniques Being Used.** C. P. Smith. *Light Metal Age*, v. 16, Oct. 1958, p. 6-7.

(G-general, K3; Ti)

583-G. **Ceramic Milling of Ferrous Materials.** Horace Frommelt. *Machine and Tool Blue Book*, v. 53, Nov. 1958, p. 83-90.

Dampening effect of powder metal holders, inserts and bodies. (G17b, X28m; CI, CN, ST, SGA-j)

584-G. Splitting Tough Steel Cylinders on Fixtured Band Machine. Leo E. Ward. *Machine and Tool Blue Book,* v. 53, Nov. 1958, p. 126-128.

(G17h; ST, 4-60)

585-G. Machining of Cylinders for Air Compressors Simplified. *Machinery,* v. 65, Nov. 1958, p. 133-134.

(G17d; CI, 4-60)

586-G. Cold-Heading. *Metallurgia,* v. 58, Oct. 1958, p. 193-194.

Recent Swiss developments in progressive headers. (G10, W24j)

587-G. Infra-Red Heat Cures Bend Troubles. E. E. Langman. *Metalworking Production,* v. 102, Oct. 24, 1958, p. 1875-1876.

Gas-fired infra-red heaters are used to facilitate forming Mg wing-panel skins which are maintained at a temperature of 400° F. to permit formation of sharp bends in leading edges.
(G9, F21b, T24a; Mg-b)

588-G. Transcript of 1958 Annual Spring Technical Meeting. *Pressed Metal Institute,* 1958, 140 p.

Symposium on cost reduction, die maintenance, modernization and safety in stamping operations. (G3)

589-G. Recent Investigations Into the Blanking and Piercing of Sheet Materials. R. Tilsley and F. Howard. *Sheet Metal,* v. 35, Nov. 1958, p. 817-828.

(G2h, G2-j; ST, 4-53)

590-G. Ultrahigh-Speed Machining: Panacea or Pipedream? A. O. Schmidt. *Tool Engineer,* v. 41, Nov. 1958, p. 105-109.

Criticism of current experiments indicating that speed alone is not a solution. (G17k)

591-G. Ultrasonic Electro-Spark Machining. Pt. 2. Genrokuro Nishimura, Kunio Yanagishima and Toshio Shima. *University of Tokyo, Faculty of Engineering, Journal,* v. 25, Mar. 1958, p. 237-242.

(G24a)

592-G. Ultrasonic Electro-Spark Machining. Pt. 3. Low Frequency Vibration in Work-Piece. Genrokuro Nishimura and Seiken Shimakawa. *University of Tokyo, Faculty of Engineering, Journal,* v. 25, Mar. 1958, p. 243-246.

(G24a)

593-G. Ultrasonic Electro-Spark Machining. Pt. 4. Low Frequency Vibration in Work-Piece. Genrokuro Nishimura and Seiken Shimakawa. *University of Tokyo, Faculty of Engineering, Journal,* v. 25, Mar. 1958, p. 247-251.

(G24a)

594-G. Ultrasonic Electro-Spark Machining. Pt. 5. Dimensional Effect and Deep Hole Machining. Genrokuro Nishimura, Kunio Yanagishima and Toshio Shima. *University of Tokyo, Faculty of Engineering, Journal,* v. 25, Mar. 1958, p. 253-259.

(G24a)

595-G. Electrical Diamond Die Drilling. *Wire Industry,* v. 25, Oct. 1958, p. 963, 977.

Primary cone is drilled by high-voltage sparks formed at the point of a needle electrode in contact with the face of the diamond.
(G17e, G24a, W24n; NM-k37)

596-G. (French.) **Rolled and Upset Copper, Brass and Alloy Screw Products.** *Cuivres, Laitons, Alliages,* no. 44, July-Aug. 1958, p. 3-9.

Machine tools, operations involved; advantages, applications of this type of fabrication.
(G10p, T7f; Cu-f, Cu-n)

597-G. (German.) **Finish Machining —Present, Future.** Hans H. Finkelnburg. *Industrieblatt,* v. 58, Aug. 1958, p. 319-327.

Definition of terms (honing, beam-lapping, electro-erosion); operations, applications; recently developed machinery. 10 ref.
(G19, G24)

598-G. (German.) **Economical Use of Grinding Machinery in Continuous Production.** W. Peter. *Industrieblatt,* v. 58, Aug. 1958, p. 327-332.

Two basic methods of cylindrical grinding, and three other methods derived from the two. Applications in different fields, taking continuous production into consideration. Requirements in dimensional accuracy and surface quality. (G18g)

599-G. (German.) **Effects of Grease in Belt Grinding. Pt. 2.** G. Pahlitzsch and M. Magnussen. *Metalloberfläche,* v. 12, Oct. 1958, p. 308-312.

(G18; NM-h)

600-G. (German.) **Thread Grinding.** F. Zimmermann. *Werkstatt und Betrieb,* v. 91, Sept. 1958, p. 551-556.

(G18k, T7f)

H Powder Metallurgy

139-H. Routine Apparatus for Determining the Surface Area of Metal Powders. P. Hersch. *Institute of Metals, Journal,* v. 86, Aug. 1958, p. 509-511.

Simplified version of the low-temperature, nitrogen-adsorption technique for determining specific surface area of metal powders. Modified method involves determination of one point only of the adsorption isotherm; the dead space is estimated without the use of helium, and the amount of ancillary equipment required is much reduced. 5 ref. (H11j, 1-53)

140-H. Slip Casting. Its Field Broadens. L. M. Schifferli, Jr. *Product Engineering (Design Edition),* v. 29, Oct. 13, 1958, p. 84-85.

Method able to produce intricate, larger parts; adaptable to stainless steel, titanium. (H14; SS, Ti)

141-H.* (German.) **Sintering of Beryllium Powder Without Pressure.** T. R. Barrett, G. C. Ellis and R. A. Knight. *Planseeberichte für Pulvermetallurgie,* v. 6, Aug. 1958, p. 39-47.

Electrolytic Be is refined by vacuum melting; chips are produced and powdered in ball mill. Graphite molds are filled and jolted, followed by sintering in a vacuum induction furnace at 1200-1220° C. for 6 hr. The metal obtained is machinable.
(H10e, H15; Be)

142-H. Effect of Carbon on the Quality of Sintered Carbides of the W-C-Co Type. M. Petrdlik and V. Dufek. *Hutnické Listy,* v. 10, no. 9, 1955. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB152.)

(H-general, Q-general; W, 6-69)

143-H.* Slip Casting of Metal Powders. Henry H. Hausner. *Powder Metallurgy Bulletin,* v. 8, June 1958, p. 53-67.

Selecting, weighing, mixing, stirring, degassing, pouring and molding of slip mixture. Casting is then trimmed, dried and sintered. Compares properties of slip and compact sintered powered metals. Chemical analysis, particle size distribution and apparent density of Type 316 stainless steel powder; relationship between viscosity and pH value for slip casting. (H10h; SS)

144-H.* Continuous Production of Strip From Metal Powder by the Direct Rolling Process. D. K. Worn. *Sheet Metal Industries,* v. 35, Aug. 1958, p. 615-619.

Broad capabilities and limitations of the process considered from technical and economic points of view. Recent development makes this process competitive with conventional methods for production of Ni and Cu strips, and in specialized fields where materials must be produced by powder metallurgy. 17 ref. (H14j; Ni, Cu, 4-53)

145-H. (Russian.) **Effect of Nonmetallic Additions on the Strength of Platinum at High Temperatures.** I. F. Belyaev. *Tsvetnye Metally,* no. 6, 1957, p. 57-61.

Addition of metal oxides to Pt powder increases its strength at 1200° C. by several times without reducing ductility and corrosion resistance. The high heat resistance of powder with metal oxide additions is explained by the presence of disperse oxide particles disposed along the grain boundaries and inside the grains, and also by the structure, which possesses a smaller grain size and a fine mosaic structure. (H12, Q27a, 2-62; Pt, AD-q40)

146-H.* Vacuum Reactions of Niobium During Sintering. William D. Klopp, Chester T. Sims and Robert I. Jaffee. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 106-120.

Purification of powder-metallurgy Cb bars by removal of oxygen, nitrogen and carbon during vacuum sintering at 2000 and 2150° C. was investigated. Mixtures of columbium oxide and columbium carbide were analyzed after sintering at 1500 to 2150° C. The thermal stabilities of commercial purity columbium oxide, columbium nitride and columbium carbide investigated by heating in vacuum up to 2150° C. Mechanisms for removal of oxygen, nitrogen and carbon during high-temperature vacuum sintering. 19 ref.
(H15, 1-73; Cb)

147-H. Slip Casting Cermets. *Metal Industry,* v. 93, Sept. 26, 1958, p. 252.

(H14; 6-70)

148-H. Sintering of Metal Powder Mixtures, System Copper-Nickel. Similarly Shaped Powder Particles. Y. E. Geguzin. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 406-417. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB4.)

Previously abstracted from original. See item 132-H, 1956.
(H15; Cu, Ni)

149-H. Aluminum Powder Metallurgy. F. V. Lenel, A. B. Baskensto and M. V. Rose. Rensselaer Polytechnic Institute. *U. S. Office of Technical Services,* PB 121136, June 1955, 85 p. $2.25.

Procedures used at Rensselaer Polytechnic Institute in producing Al powder extrusions from flake pigment powders and from atomized

powders. Powder properties and mechanical properties of the extrusions were tested. Yield strength at room temperature and at 400° C. increased directly with the square root of the reciprocal of the average flake thickness; weight per cent of oxide was not as important as the flake thickness in strengthening the extrusions.
(H14k, Q-general; Al, 4-58)

150-H. Investigation of Molybdenum and Molybdenum-Base Alloys Made by Powder Metallurgy Techniques. W. L. Bruckart, C. M. Craighead and R. I. Jaffee. Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 127913, Jan. 1955, 172 p. (Available at Library of Congress, Washington, D. C.—Microfilm $8.10; Photostats $27.30.)

Hydrogen sintering and vacuum sintering studied for the following addition elements: Al, B, Be, C, Cb, Co, Cr, Fe, In, Mn, Ni, P, S, Si Sn, Ta, Th, Ti, V, W and Zr. Evaluation of alloys made with these elements included room-temperature strength, hardness, bend ductility, hot hardness, creep characteristics and resistance to recrystallization. The following oxides were studied as additions to Mo: Al_2O_3, BaO, CaO, CeO_2, Cr_2O_3, MgO, SiO, SrO, ThO_2 and ZrO_2.
(H15, 2-60, Q-general; Mo)

151-H.* Porous and Infiltrated Metal. J. E. Elliott. *Birmingham Metallurgical Society Journal,* v. 38, Sept. 1958, p. 105-128.

Selection of powders, mixing, compacting, press tools, sintering, sizing, impregnation of Cu-Sn and Cu-Fe products. (H-general; Fe, Cu, Sn)

152-H.* (German.) **Grain Growth Retarded by Trace Elements in Carbonyl Sintered Iron.** Gunther Weise and Friedrich Erdmann-Jesnitzer. *Bergakademie,* v. 10, May-June 1958, p. 316-321.

Four groups of samples tested: Fe + 0.02 to 0.08% C, Fe + 0 to 0.1% N, Fe + 0.05 to 0.3% P, Fe + 0.05 to 0.2% Cu. Grain growth retarded in proportion to the amount of alloying element. This was observed in vacuum sintering but occurred in hydrogen sintering only when P was the alloying element. 10 ref. (H15q, N3; Fe)

153-H.* (Russian.) **Compacting Ternary Mixtures of Metallic Powders.** B. Ya. Pines and A. F. Sirenko. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 261-267.

Investigation of systems Cu-Fe, Ni-Fe and Cu-Ni showed that objects made of ternary mixtures of metal powder, subject to compacting, have a tetragonal relationship (as to the degree of shrinkage and endurance limit) to the degree of concentration. Previous studies and conclusions as to shrinkage and endurance limit of binary alloys are fully applicable to ternary alloys. 4 ref. (H14, P10d, Q7; Cu, Fe, Ni)

154-H. Continuous Sintering of Quality Powdered Metal Parts in Mechanized Furnace. *Industrial Heating,* v. 25, Oct. 1958, p. 1964-1966, 1968.

(H15; 1-61)

155-H. Exothermic and Purified Exothermic Atmospheres for Sintering Powder Metal Parts. H. M. Webber. *Industrial Heating,* v. 25, Oct. 1958, p. 2000-2002, 2004, 2006, 2008, 2012.

(H15q)

J Heat Treatment

327-J. (Slovene.) **Effect of Carburizing the Exterior Surface on the Deformation Process of Steel.** M. Zumer and V. Prosenc. *Rudarsko-Metalurski Zbornik,* no. 4, 1956, p. 327-335.

Specimens machined from 0.07% C steel were normalized and then carburized at different holding times and temperatures. Tensile strength increased with increase both in holding time and temperature, whereas elongation drops sharply. After carburizing at 920° C. for 50 min. the yield point disappears completely. The decrease in plasticity after carburization can be explained by assuming that the slip planes cannot reach the outer surface because the hard carburized layer prevents it. (J28g, Q-general; ST)

328-J. Bath, Shaker or Salt? Sampling Selects Best Carburizing Method. *Metalworking,* v. 14, Oct. 1958, p. 7-9.

Statistical sampling of results of various heat treating methods permits application of appropriate system. Part size, volume and determining factors. (J28g, S12j)

329-J. Precipitation of Cu in Ge. Pt. 3. Quench Effects in Nearly Perfect Crystals. A. G. Tweet. *Physical Review,* v. 111, July 1, 1958, p. 67-71.

Electrically active metastable centers with energies very near the valence band are formed in the early stages of heat treatment of Cu-doped Ge at 500° C., and below. (J26, N7; Ge, *Cu*)

330-J. Dew Point Monitoring Pays Off. A. R. Keefe and M. R. Koehn. *Steel,* v. 143, Oct. 13, 1958, p. 100-101.

Dew points of furnace zones are monitored by recorders in heat treat office, bringing better quality carburizing at less cost.
(J2k, X7g; ST)

331-J.* Practical Pointers for Profitable Heat Treating. A. S. Eves. *Modern Machine Shop,* v. 31, Nov. 1958, p. 108-115.

Tips for case hardening steel economically. Effect of the cooling rate; techniques for case hardening; cyaniding, light casing, aerocasing, carburizing, (pack and rotary), carbonitriding. It is found that "movement" is less when the case needed is shallow and when low heats can be used and if enough hardness can be obtained by quenching in hot oil or molten salts. (To be continued.)
(J28; ST)

332-J.* (German-English.) **Gas Carburizing and Carbonitriding.** F. W. Haywood. *Harterei-Technische Mitteilungen,* v. 11, no. 2, 1958, p. 23-52.

Chemistry of box carburizing and gas carburizing. Formulas for computing carburizing time for any desired depth. Different carburizing atmospheres analyzed. Furnaces and plants. Chemistry of process and advantages of carbonitriding. 5 ref.
(J28g)

333-J.* (German.) **Preparation of Carburizing Gases.** Theodor Schmidt. *Harterei-Technische Mitteilungen,* v. 11, no. 2, 1958, p. 9-22.

Composition of different gases such as Co, water gas, protective gases, methane, propane, city gas. Composition of the latter three gases when "adjusted" with charcoal at 1000° C. Plants for the preparation of methane-air and city gas-air mixtures. (J28g, B25)

334-J.* (German.) **Hardening of Gear Wheels.** Hans Sigwart. *Harterei-Technische Mitteilungen,* v. 12, no. 2, 1958, p. 9-22.

Residual compressive stresses in a case hardened part studied and applied to the stress situation in a case hardened gear tooth. As tests showed, the bending durability of teeth in gears made from 20MnCr5 steel decreased steadily with increasing depth of case, starting from a maximum of 70 kg. per sq. mm. at 0.2 mm. case depth. Properties of 20MnCr5 and other steels tested and compared. 6 ref.
(J28, Q25h, T7a; ST)

335-J.* (Russian.) **Effect of Ultrasonics on Diffusion Processes in Steels and Alloys at High Temperatures.** G. I. Pogodin-Alekseev. *Metallovedenie i Obrabotka Metallov,* June 1958, p. 14-17. (Henry Brutcher, Altadena, Calif., Translation no. 4247.)

Samples were heated in an electric furnace and exposed to the action of ultrasonic vibrations produced by magnetostriction. For control parallel experiments were carried out without ultrasonics. In case hardening steel the case was deeper and its depth depended on the intensity of vibrations. Ultrasonics accelerates the aging process in alloys, increases hardness and reduces shock resistance. (J28, 1-74; ST)

336-J. Effect of Grain Size of 20Kh. Steel Cogwheels During Heat Treatment. N. M. Tarasov and M. R. Semenchenko. *Metallovedenie i Obrabotka Metallov,* no. 1, 1955. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

(J-general, M27c; ST)

337-J. (Russian.) **Properties of Steel 45 With Boron.** Ya. E. Gol'dshtein, L. S. Lyakhovich, L. L. Pyatokova and G. M. Trusenev. *Stal',* no. 5, 1957, p. 449-451.

Properties of steel 43R containing 0.002-0.006% B are compared with those of ST 45 and 45G2. The hardening capacity of ST 43R with B is considerably higher than that of ST 45 and somewhat lower than 45G2. The critical diameter on quenching in water is 18-20 mm. for ST 45 and 38 mm. for 45R. ST 45R and 45 have the same mechanical properties for specimens from heat treated billets 15 x 15 x 60 mm.
(J26, Q-general; ST, *B*)

338-J.* Process Speed. *Iron Age,* v. 182, Nov. 6, 1958, p. 108-109.

Passing strip steel through 30 ft. of liquid sodium completes annealing process in 85% less time. High rate of heat transfer, low equipment cost. (J23, W28p, 1-61; ST, *Na*)

339-.J* Vacuum Heat Treating. Roger R. Giler. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 161-167.

Applications of vacuum heat treating, evolution of commercial vacuum furnaces including double pump barrel and pit types; hot retort and cold retort types.
(J-general, W27, 1-73)

340-J. Special Steels for Nitriding. *Iron Age*, v. 182, Oct. 16, 1958, p. 198.

Special nitrided steels containing 0.85-1.20% Al provide an extremely hard surface. Because the nitrided layer is stressed in compression, its fatigue properties are excellent. There are four types of Nitralloy steels: Grades 135, 135 modified, Nitralloy N and Nitralloy EZ. Grades 135 and 135 modified are the most widely used, especially in the aircraft industry. (J28k; ST)

341-J. Marquenching. *Mechanical World and Engineering Record*, v. 138, Aug. 1958, p. 349-350.

Equipment and quenching media. Steels for which marquenching process is suitable. (J26p; ST)

342-J. How to Check Commercial Salt Baths for Their Carbon Content. B. Finnern. *Harterei-Technik & Warmebehandlung*, v. 2, no. 10, 1956, p. 99-100. (Henry Brutcher, Altadena, Calif., Translation no. 4306.)

Practical experience gained in continuous routine testing and control of carburizing power of carburizing baths, expressed by their carbon content, by use of the foil method. Effect of quantity of steel treated in baths on the latter's carbon value. Effect of carburizing time on carbon content of case, especially Cr-Mn and Cr-Ni carburizing steels. Special importance of control of bath for steels subjected to alternating stresses in service. (J28g, W27m, S11)

343-J. Stabilizing Heat Treatments of 5% Aluminum-Magnesium Alloys Against the Effects of Heating at Low Temperatures. Pt. 1. A. Guilhaudis. *Revue de l'Aluminium*, no. 223, July-Aug. 1955, p. 717-725. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB39.)

Previously abstracted from original. See item 265-J, 1955. (J-general, R2; Al)

344-J. (Dutch.) **Quenching Oils Removed by Rinsing.** K. H. Kopietz and J. G. van Overvest. *Metalen*, v. 13, Aug. 15, 1958, p. 273-279.

Film of special oils can be rinsed with water in which it forms an emulsion. Carbon steel C15 test pieces quenched in different water emulsive oils showed clean surfaces after rinsing. (J26, W28p, L12e; CN)

345-J. (Czech.) **New Data on the Structure of Carbonitride Layers.** Josef Cadek. *Hutnicke Listy*, v. 12, no. 7, 1957, p. 597-604.

When the layer contains more than 0.5% N, microscopic porosities are formed, caused by the liberation of N in the form of molecular, nondiffusing N_2 from the atomic N in the austenite. Separation of N in molecular form, in turn, is related to the local thermodynamic activity of N on the grain boundaries, an activity connected not only with the N content, but also with the carbon concentration. (J28m; ST)

346-J.* (Russian.) **Characteristics of Tempering After Induction Hardening.** I. N. Kidin, E. V. Astaf'eva and A. N. Marshalkin. *Metallovedenie i Obrabotka Metallov*, v. 4, Sept. 1958, p. 2-12. (Henry Brutcher, Altadena, Calif., Translation no. 4348.)

Relationship between the procedure of high-frequency induction hardening and subsequent tempering; between the character of carbon distribution after hardening and its redistribution after tempering, which has a substantial effect on mechanical properties of hardened and tempered steels. Tests conducted on steel 40KhN and 40KhG specimens hardened by continuous-successive method. After hardening, specimens were heated for 2 hr. at 200 to 650°. After heating to 500° specimens were tested on impact pendulum with 15 kg. power. Hardening with 1000° and tempering steel 40KhN results in same properties as in usual hardening and tempering. But hardening at 900°, with the same heating rate and tempering, results in maximum combination of properties—the impact rupture and hardness indexes are much higher. 16 ref. (J29, J2g; ST)

347-J.* (Russian.) **Possibility of Raising Temperature of Solid Carburizer to 980°.** A. M. Tarasov and M. R. Semenchenko. *Metallovedenie i Obrabotka Metallov*, v. 4, Sept. 1958, p. 39-42. (Henry Brutcher, Altadena, Calif., Translation no. 4356.)

Investigation to study possibilities of increasing temperatures to raise productivity of carburizing process. The cementation temperature during the experiments was raised to 980° using steels 20KHGR, 20KHNM, 20KH and 20. Under conditions of repeated heating after quenching it is possible to recommend cementation of parts in solid carburizers at 980°. The quality of carburized layers is improved. As a result of cementation at 980°, the productivity of the process is increased by 40-50% as compared to cementation at 910°; by 15% as compared to 950° cementation. (J28g; ST)

348-J.* **Potential of Higher Temperature Carburizing.** *Metal Progress*, v. 74, Oct. 1958, p. 134-139.

Manufacturers are becoming interested in carburizing at higher temperatures to increase production. First moves by heat treaters will probably be to the 1800 to 1850° F. range which will give carburizing rates about 50% higher than at 1700° F. Even higher temperatures may be used in the near future for thick cases on tractor gears and other heavy-duty equipment. (J28g, 1-66, W27; ST)

349-J. Gas Carburizing and Case Hardenability. T. W. Ruffle. *Metal Treatment*, v. 25, Oct. 1958, p. 397-403.

Test pieces were treated in a continuous, pusher-operated, three-track furnace, radiant tube heated in four zones, the atmosphere being endothermic gas made from air-propane with appropriate propane furnace addition. Steels investigated include SAE 4620 and SAE 8620. 6 ref. (J28g; ST)

350-J.* (French.) **Changes in Surface Coloring of 18-Carat Gold Alloys.** G. Rey-Coquais. *Chimie et Industrie*, v. 80, July 1958, p. 11-12.

Yellowing or "greening" of Au alloys is due principally to action of air during successive anneals: Cu is converted into copper oxide, which can be dissolved by sulphuric acid. Various processes make it possible to avoid this color change or to regenerate the alloy at its surface. The latter are preferable, as surface color changes take place during all processes of fabrication of Au objects. (J23; Au-b)

351-J.* (German.) **Increasing Tensile Strength of Cogs by Hardening.** H. Rettig. *Industrieblatt*, v. 58, Oct. 1958, p. 435-442.

Steels and hardening methods best suited for each type. Advantages and disadvantages of common hardening procedures: carburizing, induction and flame hardening, nitriding. Results of tests on strength, torsion and wear resistance. 16 ref. (J28, J2g, J2h, Q27a, Q1, Q9n; ST)

352-J.* (German.) **Steps Indicated to Control Distortion.** O. Liedholm. *Industrieblatt*, v. 58, Oct. 1958, p. HT77-HT79.

Different factors contributing to, or influencing distortion. Type of steel used; forging methods; intermediate treatment of material before machining; machining and resulting tensions in material; accuracy in working parts before heat treatment; carburizing; quenching method; shape of parts to be heat treated. Deals mostly with types of steel and an attempt is made to decide which steel is best suited for direct hardening. (J-general, 9-74; ST)

353-J.* (German.) **Gas Carburizing.** Birger Lineberg. *Industrieblatt*, v. 58, Oct. 1958, p. HT79-HT80.

For parts subjected to great surface loads, in which distortion must be kept low and surface hardness at a constant high level, gas carburizing, using two liquids, proved adequate. Austenite and carbide in Cr-Ni steels can be kept within limits, while carbon content in surface layers does not exceed 0.8-0.95%. (J28g; ST, *Cr, Ni*)

354-J.* (Italian.) **Induction Hardening of Spheroidal Cast Iron.** V. Gottardi. *Fonderia Italiana*, v. 7, Sept. 1958, p. 331-334.

In cast iron having martensite matrix speed of graphitization is greater than with pearlitic matrix. Graphite precipitating at grain boundaries shows no tendency to migrate toward nodules but becomes stable and spheroidal at boundaries. This ferritic iron responds well to very brief thermal cycles (3 to 5 min.) such as employed in induction and flame hardening. Ferritic spheroidal iron parts can be induction hardened on surface without sacrificing malleability of interior. 6 ref. (J2g; CI-r)

355-J.* (German.) **Heat Treatment of Aluminum Bronze Castings.** Ernst Brunhuber. *Giesserei*, v. 45, Oct. 23, 1958, p. 667-670.

Investigations on Cu-Al-Fe and Cu-Al-Fe-Ni alloys. Heat treatment is performed in two steps: first by heating up to the range where the beta phase is steady with subsequent quenching to preserve this phase at room temperature, then by heating again and quenching, to improve mechanical properties. 5 ref. (J-general, 5-60; Cu-s, *Al, Fe, Ni*)

356-J.* (German.) **Hardening of Carbon Steel.** *Technica*, v. 7, Jan. 6, 1958, p. 716-718.

Structure of ferrite and several carbon steels with different percentage of carbon. Changes in the structure of carbon steel with different heat treating methods. Quenching baths. Incompletely hardened pieces must be annealed before rehardening. Iron-carbon diagram. Graphs of annealing and hardening temperatures of carbon steel. Micrographs of structure of different carbon steels. (J23, J26, M27; CN)

357-J. Heating and Cooling of Flat Strip. Pt. 1. A. H. Vaughan. *Industrial Heating*, v. 25, Oct. 1958, p. 1954-1963, 2180.

Graphs for computation of heating and cooling times in various ca-

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

pacity controlled-atmosphere and vacuum furnaces. 9 ref. (J-2; 4-53)

358-J. Property Changes in Steel Due to Low-Temperature Quenching. Pt. 5. Age-Hardening Capacity and Fatigue Strength. Tadakazu Sakurai and Tadashi Kawasaki. *Japan Society of Mechanical Engineers, Transactions*, v. 24, July 1958, p. 532-538.

18 ref. (J27d, Q7a; ST)

359-J. Heat Treating Large Aluminum Extrusions. *Light Metal Age*, v. 16, Oct. 1958, p. 14-15.

Extremely large and long sections of 7075 and 7178 Al heat treated and quenched in short time without distortion.
(J26, W27g; Al-b, 4-58)

360-J. Furnace Slashes Annealing Costs in Half. *Steel*, v. 143, Nov. 3, 1958, p. 70-71.

Continuous operation through annealing and relubrication of deep-drawn parts has eliminated pickling and reduced material handling.
(J23, G4b, 18-74, 17-53; ST)

361-J. Effect of Working Conditions on Mechanical Properties, When Patenting Rope Wires After Electric Resistance Heating. W. Lueg and K. Schemmer. *Wire Industry*, v. 25, Oct. 1958, p. 939-941. (From *Stahl und Eisen*, July 10, 1958.)

Previously abstracted from original. See item 285-J, 1958.
(J25, Q-general, 3-68; ST, 4-61)

362-J. Measurement of Carburizing Efficiency of Salt Baths. O. Schaaber and R. Fischer. *Härterei-Technik und Wärmebehandlung*, v. 2, no. 10, 1956, p. 89-90, 92-96. (Henry Brutcher, Altadena, Calif., Translation no. 4308.)

Determination of carbon potential over a 60-day period, at 900° C. of an activated three-salt bath with constant potassium cyanide content.
(J2j)

363-J. Heat Treatment of Aluminum-Zinc-Magnesium-Copper Alloys. M. Tournaire and G. M. Renouard. *Metaux Corrosion Industries*, v. 22, Mar. 1957, p. 95-101. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1276.)

Previously abstracted from original. See item 104-J, 1957.
(J-general, Q21b, Q23; Al, *Zn*, *Mn*, *Cu*)

364-J. Design, Mode of Operation and Operational Results of a Modern Wide Strip Annealing Plant. V. Seul and J. Billigmann. *Stahl und Eisen*, v. 77, Mar. 21, 1957, p. 309-323. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 93-J, 1957.
(J23, W27, 1-61; ST, 4-53)

365-J. Influence of Heat Treatment in a Magnetic Field on the Structure and Mechanical Properties of Steel. H. Jahn. *Stahl und Eisen*, v. 78, Feb. 6, 1958, p. 178-180. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1262.)

(J-general; Q-general; ST)

366-J. (German.) **Distortion in Hardening of Tools.** M. Winkel. *Industrieblatt*, v. 58, Oct. 1958, p. HT82-HT86.

(J-general, T6; ST, 9-74)

367-J. (German.) **Electric Heat-Current Model for Practical Induction Heating.** Herbert Geisel and Lothar Liebing. *Industrieblatt*, v. 58, Oct. 1958, p. 446-449.

To solve problems in induction heating, a simple model was built for practical tests. A number of questions answered and evaluated graphically. (J2g)

K Assembling and Joining

599-K.* New Power Source Broadens Use for CO_2 Welding. H. J. Bichsel, E. J. Steinert and E. R. Gamberg. *Iron Age*, v. 182, Oct. 23, 1958, p. 61-63.

Automatic all-position CO_2 welding is now possible by the use of a dynamic reactor, developed by Westinghouse, that limits the rate of weld current. It permits the use of larger wire sizes and, for the first time, use of CO_2 for vertical and overhead welding.
(K1d, W29c)

600-K.* (Slovakian.) **How to Weld Circular Sections by the Vertical Electro-Slag Process.** Julius Zeke. *Zvaranie*, v. 7, July 1958, p. 196-200.

With rectangular sections the space between the parts to be welded is filled, starting from a shelf. To provide secure welding of circular sections two designs are illustrated.
(K6)

601-K. Design for Production by Welding. John Mikulak. *Welding Journal*, v. 37, Sept. 1958, p. 871-881.

Weldments designed for optimum performance and fabrication economy often combine castings, forgings, pressings and extrusions with plates and shapes. (K-general, 17-51)

602-K. Inert Gases for Controlled-Atmosphere Processes. E. F. Gorman. *Welding Journal*, v. 37, Sept. 1958, p. 882-889.

Effective application of argon or helium for controlled-atmosphere processes depends upon utilization of appropriate purging techniques for chambers or furnaces.
(K1d, W29e)

603-K. An Investigation of Lap Seam Welds in 17-7 PH Stainless Steel. E. J. Funk and A. C. Willis. *Welding Journal*, v. 37, Sept. 1958, p. 897-905.

Development and calibration of instrumentation for measurement of welding current. Seam welding of 17-7 PH stainless steel in TH-1050 condition. (K3p; SS)

604-K. (Czech.) **A New Type Ceiling-Mounted Spot Welding Machine.** Ladislav Pliva. *Zvaranie*, v. 7, Aug. 1958, p. 238-244.

Welding machine KP24 (24-kva. transformer efficiency), and tongs.
(K3n, 1-52)

605-K.* High Strength Titanium Alloy Has Good Weldability. F. A. Crossley. *Iron Age*, v. 182, Oct. 30, 1958, p. 84-86.

With low alloying additions the best hope of getting high strength lies in age or dispersion hardening. A new Ti-3Mo-0.25Be alloy shows commercial promise. Data were obtained for a 10-lb. ingot made from 100-Bhn. sponge by double arc melting. Graph shows hardness versus solution temperature and aging time. Data on tensile strength, structure, strength of fusion welded samples, creep resistance.
(K9s, J27, Q-general; Ti-b)

606-K.* Die-Cut Adhesive Film Bonds Iron to Aluminum. *Iron Age*, v. 182, Oct. 30, 1958, p. 88-89.

High-strength, thermosetting film adhesive, a nitride phenolic. Room-temperature shear strength of the film ranges from 2800 to 3500 psi., and its peel strength is 168 lb. per in. of film width. Other qualities of the film adhesive include good flexibility and resistance to salt spray, high humidity and oil. Assembly of plates. (K12; Fe, Al)

607-K.* Quality Welds Join Missile Engine Frames. George H. DeGroat. *Metalworking Production*, v. 102, Oct. 10, 1958, p. 1787-1788.

All welding is by the gas-shielded arc technique with tungsten electrodes and AWS 502 filler rod. Complete penetration is required in all joints. The arc-shielding gas is argon, which is also applied as a back-up gas on lower joints in the frame. A lighter-than-air mixture of 75% He and 25% A is the back-up for upper frame joints.
(K1d, T24b)

608-K.* New Techniques for Welding Aluminum Plate. A. A. Smith. *Welding and Metal Fabrication*, v. 26, Sept. 1958, p. 312-317.

Supplementary argon nozzle enables satisfactory welding at currents hitherto unusable because of the formation of gross oxide films and unstable arc condition known as puckering. (K1d, 1-52; Al)

609-K.* Post-Weld Treatment of Welded Units for the Relief of Stress S. J. Watson. *Welding and Metal Fabrication*, v. 26, Sept. 1958, p. 318-322.

Relief of residual stresses generated by thermal contraction after welding minimizes risk of subsequent distortion or cracking. Level of residual stress after heat treatment depends on such factors as material composition, stress-relieving temperature and time, stress level before treatment. 9 ref.
(K9q, J1a)

610-K.* Fabrication Reactors for a Catalytic Reforming Unit. *Welding and Metal Fabrication*, v. 26, Sept. 1958, p. 323-327.

Difficult welding and fabricating problems in the construction of Cr-Mo steel reactors, and pressure vessels for a catalytic reforming unit. Three welding methods were used: manual metal arc, automatic submerged arc and inert-gas-shielded arc. (K1, T26q, W11p; AY, *Cr*, *Mo*)

611-K.* Vacuum Welding of Metals. J. A. Stohr and J. Briola. *Welding and Metal Fabrication*, v. 26, Oct. 1958, p. 366-370.

Ability to concentrate considerable energy on very small surface areas facilitates production of high-quality, accurate welds, which cannot be obtained by any other fusion method. Localization of energy precludes undue over-all heating of the workpiece to avoid distortion and to produce accurate fabrications. Chemical cleanliness makes the process of interest to industries such as atomic energy or the manufacture of electronic valves. (K6, 1-73)

612-K.* Practical Aspects of Automatic Welding. J. A. Lucey. *Weld-*

ing and Metal Fabrication, v. 26, Oct. 1958, p. 375-380.

Processes for automatic arc welding of carbon steels compared, namely: submerged-arc, using a continuous coil of bare wire and a granulated welding composition which shrouds the arc; visible arc, employing a continuously coated electrode, generally known as the Fusarc process; Fusarc/CO_2 process, in which a shield of carbon dioxide gas is used in addition to the coated electrode. Study of joint design, edge preparation and fit-up, joint cleanliness and welding in the open welding current, arc voltage, speed and gage of electrode is made. (To be continued.) (K1)

613-K.* (German.) **Welding of Nickel and Nickel Alloys.** H. Herrmann. *Giesserei Praxis,* no. 17, Sept. 10, 1958, p. 344-346.

Because of high corrosion resistance, Ni and Ni alloys are increasingly used for coatings on iron and steel. Physical properties of pure Ni and different alloys. Characteristics of Monel, K-Monel, Corronel, Inconel. All types are well suited for welding procedures provided preparation of joints and condition of material is adequate. Six types of welding are autogenous, electric arc, carbon arc, inert-gas-shielded, atomic hydrogen and resistance welding. (K-general; Ni)

614-K.* (German.) **Long-Time Stress Tests With Bonded Light Metal Joints.** K. F. Hahn. *Metall,* v. 12, Sept. 1958, p. 811-814.

Light metal strips (Al-Cu-Mg) 20 x 1.5 mm. bonded with "Araldit 123B" and "Redux". Joints affected by high temperatures; even at room temperature elongation and breaking in finite time were observed with a load of 50% breaking strength. 7 ref. (K9, K12; Al-b)

615-K.* (German.) **Internal Stresses in Welds Detected by New Method.** W. Radecker. *Schweissen und Schneiden,* v. 10, Sept. 1958, p. 351-358.

Stresses in rimming converter steel, rimming openhearth steel, mild steel, steel for gas cylinders tested by filling a circular notch on the surface using different electrodes and boiling the weld in a 60% solution of anhydrous calcium ammonium nitrate. By observing corrosion along hairline cracks, stresses can be detected. Effect of stress-relief treatment. 5 ref. (K9r, Q25, 1-54; ST)

616-K.* (German.) **Experiments With the Electroslag Welding Process.** R. Muller. *Schweissen und Schneiden,* v. 10, Sept. 1958, p. 359-367.

Experimental welding of 50-mm. sheet metal with 44 v. and about 500 amp. with one electrode. Slag produced with powder UM 90. Process explored by X-rays. Relationship between feeding speed of electrodes and amperage and feeding speed and specific electric energy. Welds made with different electrodes, base metals, more than one electrode, stationary and swinging electrodes. Examination by metallograph, chemical and physical tests. 6 ref. (K6)

617-K.* (Japanese.) **Cold Welding of Metals Other Than Iron.** T. Saito and K. Yamaji. *Metals,* v. 28, Sept. 1958, p. 702-708.

Temperature change of the surface is observed by a thermocouple during the welding process but no appreciable change is found. Microscopic test, even with electron microscope, cannot detect the welded surface. Atomic diffusion of Al in Cu solid solution near the welded surface is detected by electron diffraction analysis. During the process of cold welding, many dislocations may occur under large stress and, therefore, many atomic vacancies may occur, which make atomic diffusion possible. (K5)

618-K. New Welding Techniques Ready Titanium for CPI. *Industrial and Engineering Chemistry,* v. 50, Sept. 1958, Pt. 1, p. 71A-72A.

Simple fusion, resistance and flash welding techniques. Shielding with argon and helium is required. (K-general; Ti-b)

619-K. Pressure Welding of Metals. D. R. Milner. *Nature,* v. 182, Sept. 6, 1958, p. 638-639.

Report on Conference at University of Birmingham, June 19, 1958. (K5)

620-K.* (French.) **Deep Penetration Arc Welding With Coated Electrodes. Pt. 4. Results. (Installment 2.) Effects of Electrical Characteristics on Depth and Uniformity of Penetration. Study of Soundness and Mechanical Characteristics of Joints.** A. Gaubert. *Soudage et Techniques Connexes,* v. 12, July-Aug. 1958, p. 249-262.

Evaluation of penetration and joint soundness in welds made on a.c. and d.c. and with various types of current-generating equipment. Other factors found to influence soundness were welding speed, arc length and water content of electrode coatings. Mechanical characteristics and crack sensitivity were determined in temperature range from minus 20 to plus 40° C. A killed Martin steel was principal test material; a few tests were made on Thomas steel. (K1a; ST)

621-K.* (French.) **Welded Equipment at the Marcoule Plutonium Extraction Plant.** P. Couturier. *Soudage et Techniques Connexes,* v. 12, July-Aug. 1958, p. 277-289.

Welding procedures used on stainless steel piping, storage and processing tanks in extraction and purification equipment, where corrosion (nitric acid) and absolute tightness are of prime importance. Since operations started only recently, no data are available on performance of welds; however, mechanical tests and radiographic inspection of welded assemblies indicate that they will be satisfactory. Extraction process is described and diagrammed. (K-general, C-general, T29, 17-57; Pu, SS)

622-K.* High Quality Fusion Welding of Aluminum. Pt. 3. Tungsten Electrodes. Thomas B. Correy. *Light Metal Age,* v. 16, Oct. 1958, p. 8-13.

Discussion of pure W, Th-W and Zr-W electrodes; various factors affecting weld quality; effect of improper gas flow; ventilation. 25 ref. (K1c, W29h; W, Al-b)

623-K.* (German.) **Spot Welding of Heavy-Duty Aluminum Alloys.** E. A. Otte. *Aluminium,* v. 34, Sept. 1958, p. 543-544.

Features of machines used in spot welding heavy-duty materials (Al-Cu-Mg and Al-Zn-Cu-Mg alloys in airplane construction; Al-Mg-Si, $AlMg_3$ alloys in shipbuilding). Electronic control; measuring amperage and time by the Rogowski belt plus an oscillograph; control of pressure exerted by electrodes. (K3n, 1-52; Al-b)

624-K.* (German.) **Metal Bonding Adhesives and Their Applications.** E. Bader. *Werkstatt und Betrieb,* v. 91, Sept. 1958, p. 565-571.

Adhesives which will harden at ambient temperature and result in joints of high strength. Fields of application, suitable designs and constructions for bonding with adhesives. Adhesive layer with glass fiber, pretreatment of workpieces, processing of adhesives, test results. 26 ref. (K12)

625-K.* (Japanese.) **Metal Surfaces and Adhesives.** H. Hattori. *Metals,* v. 28, Oct. 1958, p. 726-730.

Cohesive force of adhesive is handicapped by the roughness of surfaces, differing thermal expansion coefficients, adsorbed water and oil, Beilby layer and oxide layer as well as the free energy of the surface. (K12, S14)

626-K.* (Japanese.) **Friction Welding.** *Metals,* v. 28, Oct. 1958, p. 772-774.

A turning lathe is used. One part to be welded is fixed and the other part is rotated. Friction causes high temperature and the two parts are plastically deformed; then lathe is stopped and the two parts are kept pressed to each other. (K6)

627-K.* (Russian.) **Effect of Electrode Vibration on Arc Welding Process and Weld Properties.** A. A. Alov and V. S. Vinogradov. *Svarochnoe Proizvodstvo,* Sept. 1958, p. 19-22.

Electrode vibration has important effect on welding process and properties. It stabilizes burning of the arc, lessens overheating of metal, improves weld seams and makes possible welding of thin parts; results in more finely grained and uniform weld; reduces the likelihood of formation of pores, cracks and similar defects. 6 ref. (K1)

628-K.* (Russian.) **Electroslag Welding of Water Turbine Shafts.** A. S. Gellman, S. N. Mel'bard and S. E. Sinadskii. *Svarochnoe Proizvodstvo,* Sept. 1958, p. 26-36.

Extensive research program to develop material and procedures for welding turbine shafts. Possibility of making shafts from rolled sheet steel. Use of Ti as modifier for steel 20 GSL was found unsatisfactory since it leads to embrittlement in zone adjacent to weld. Allowance of 50 mm. thickness with sheet diameter of 1500 mm. was found adequate for shafts; allowance of 16% for compensation for welding deformation and thermal treatment. 5 ref. (K6, W11k; ST)

629-K. Taming Weld Distortion in Extra-Heavy Pieces. George H. DeGroat. *American Machinist,* v. 102, Oct. 20, 1958, p. 146-147.

How a 27-ton welded assembly was made and then machined. (K1, 3-73, 7-51, 9-74)

630-K. Production Line Steps Up Girder Welding. J. V. Banks. *Iron Age,* v. 182, Oct. 30, 1958, p. 90-92.

Giant squeezing fixture to fit flanges to webs and position assemblies for welding by automatic submerged arc. (K1e, W29k; T26p, ST)

631-K. (French.) **Chronicle of Steelmaking. Progress in the Welding of Steel.** G. Grenier. *Echo des Mines et de la Metallurgie,* no. 3519, Aug. 1958, p. 489-491.

(K-general; ST)

632-K. (German.) **D. C. Welding Machine for Railroad and Mine Power Supplies.** K. Schydlo. *Schweissen*

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

und Schneiden, v. 10, Sept. 1958, p. 374-376.

Welding machine equipped with a constant-speed governor to compensate unstable voltage. (K1, 1-52)

633-K. (German-French.) **Organization Problems in a Modern Welding Plant.** Othmar Hegi. *Zeitschrift fur Schweisstechnik,* v. 48, Sept. 1958, p. 238-245.

(K-general, A5, 1-52)

634-K. Evaluation of Cast Welding of Cermets to Austenitic Alloys. R. S. DeFries and E. E. Reynolds. Allegheny Ludlum Steel Corp. *U. S. Office of Technical Services,* PB 132831, Aug. 1956, 30 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.70; Photostats $4.80.)

Cast S-816 has the best combination of strength and ductility essential for a rotor alloy. Sound cast-welded cermets to S-816 alloy test pieces were obtained with 3½-hr. preheat at 1600° F. and pouring temperature of 2900 to 3000° F. This was determined from metallographic examination and tensile tests. (K6, Q-general; SS, 6-70)

635-K. Relationship of Metal Surfaces to Heat Aging Properties of Adhesive Bonds. J. M. Black and R. F. Blomquist. *National Advisory Committee for Aeronautics TN 4287,* Sept. 1958, 30 p.

Thermal-aging properties of five different chemical types of adhesives on stainless steel and Al revealed that a phenol-nitrile rubber adhesive was superior to a phenol-epoxy adhesive on steel, but this order was reversed on Al. Observations indicated probable specific relationships among chemical structure of the adhesive, metal adherend and the resultant thermal stability of bonds after aging at high temperatures. 12 ref. (K12; SS, Al)

636-K. Research Destructive Test Methods for Weldability. William L. Warner. Paper from "Conference on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 59-90.

Tests for true weldability must show adequate demonstration of the metal's sensitivity to the effects of welding; good reproducibility of the test data from test to test; reasonable simplicity of specimen preparation and method of testing the specimen; good correlation of test results with service performance. 15 ref. (K9s, 1-54)

637-K.* (German.) **Contribution to the Arc Welding of Aluminum Alloys.** *Draht,* v. 9, Aug. 1958, p. 302.

Formation of cracks has been noted in welding thick Al-Mg-Si sheet with Al + 5% Si electrodes. Results from a decrease of Si in the weld metal in the presence of the base metal. Best results obtained when a W electrode of a duralumin alloy, H14 or H15, together with an Al-Zn-Mg-Cu base metal of 2.5 to 12.7 mm. thickness, were used and the joint was heat treated. (K1; Al-b)

638-K.* (German.) **Application of the Iron-Carbon Diagram in Welding Technology.** Friedrich-Carl Althof and Gerhard Hoffman. *Schweisstechnik,* v. 12, Aug. 1958, p. 105-112.

Welding of carbon steel; processes determined by the carbon content; pressure welding up to 1.7% C, fusion welding from 0.25% up. Effect of welding on the structure of material. Studies on stress-relief annealing, spheroidizing, normalizing, homogenizing, hardening and tempering. 10 ref. (K9, J-general; ST)

639-K.* (Slovakian.) **Repair of Cast Iron Machine Parts by Gas Welding.** Vladimir Mutnansky. *Zvaranie,* v. 7, July 1958, p. 213-218.

The behavior of base and weld metal is tested by grinding a small spot and applying weld metal. Then edges of break are shaped to a V-groove, preserving a root. One of the following methods is used: repair weld without preheating the part; preheating up to 400° C.; preheating up to 650-750° C. according to size and shape of part. (K2, 18-72; CI)

640-K.* Welding Stainless Steels and H. T. Alloys. Pt. 1. *Canadian Metalworking,* v. 21, Oct. 1958, p. 48-50, 52-54, 56-58, 60.

Carbide precipitation, influence of Ta, section thickness, sigma phase, knifeline attack, weld overlays and clad materials. Weldability of corrosion and heat resistant alloys. (K-general; SS, SGA-g, SGA-h)

641-K* Want Better Spot Welding? Use Basic Data. H. Thomasson. *Canadian Metalworking,* v. 21, Oct. 1958, p. 64, 66.

Basic principles of spot welding and the machine regulation of pressure and current. (K3n)

642-K.* Welding Cast Components for Nuclear-Power Application. W. H. Rice. *Foundry Trade Journal,* v. 105, Oct. 16, 1958, p. 475-476.

Small castings of simple shape and of greater soundness and quality than extremely complicated castings have led to the increased demand for cast weldments. A typical example is a pump for a land-based nuclear installation. Two cast CF-8 stainless steel halves are welded together. (K1d, W13d; SS, 5)

643-K.* Six Joints to Use When Welding Titanium. *Industry & Welding,* v. 31, Oct. 1958, p. 68-70.

Thickness of weld, electrode type and diameter, root opening, angle of bevel. (K1; Ti)

644-K.* Braze Aluminum to Stainless. *Industry & Welding,* v. 31, Oct. 1958, p. 73, 99.

Combines lightness and good heat conductivity of Al with the strength, heat and corrosion resistance of stainless steel. Brazing method results in gas and liquid-tight bond that is resistant to instant thermal shocks at high temperatures; tensile strength of the bond is greater than the parent Al; high humidity, organic materials or fungi have no effect on the metallic bond. (K8; Al, SS)

645-K.* Selecting Solders for Low-Temperature Service. A. B. Kaufman. *Materials in Design Engineering,* v. 48, Nov. 1958, p. 114-115.

Based on tensile and impact strength, two Pb solders (97.5 Pb, 2.5% Ag and 95 Pb, 5% Sn) are suitable for cold environments. Retention of ductility at low temperatures in Pb-Sn alloys is a function of the Pb content. Sn undergoes an allotropic transformation and becomes brittle under long-time service below −18° F. Increasing Pb content of Pb-Sn alloys progressively lowers the minimum temperature at which these alloys are ductile; above about 70% Pb, the alloys should remain ductile to temperatures near absolute zero. 8 ref. (K7, 2-63, Q23; SGA-f, Pb, Sn)

646-K.* Fabricating Superalloys. H. E. Haley. *Tool Engineer,* v. 41, Nov. 1958, p. 96-101.

Corrosion resistant materials (Ni-Cr-Fe-Mo alloys) require special manufacturing techniques. Welding, forming, forging, heat treating and descaling. (K1, K2; Mo-b, SGA-g)

647-K. Factors in the Selection of Welding Processes. John J. Chyle. Paper from "Conference on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 9-38.

Principal welding groups are arc, resistance, gas, forge, thermit, induction, welding, flow welding and brazing. Physical and mechanical properties of welds and joint design are correlated with each type. (K-general)

648-K. Engineering Aspects of Welding and Arc Cutting the Aluminum Alloys. P. B. Dickerson. Paper from "Conference on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 165-178.

Useful data on welds in some of the Al alloys commonly considered for arc welded construction. Strength and ductility of welds. 10 ref. (K-general, G22g; Al-b)

649-K.* Effect of Arsenic on Mechanical Properties of Welds in Mild Steel. D. Canonico and H. Schwartzbart. *Welding Engineer,* v. 43, Nov. 1958, p. 32-35.

Arsenic in steel increased transition temperature but had no significant effect on strength. (K9r; ST, *As*)

650-K.* (German.) **Sandwich Plates in Aircraft Manufacture and Other Industries. Pt. 3.** B. R. Noton. *Aluminium,* v. 34, Oct. 1958, p. 591-595.

Strength tests with the adhesive film Redux 775 used to bond side plates to the Dufaylite core (32 mm. thick) and with the adhesive Catalin 869/6B used in the manufacture of cores. The latter was allowed to set 30 min. at 150° C. and under pressures of 0.7 to 35 kg. per sq. cm. Mechanical properties and moduli of Dufaylite-cores. (K12, T24; 7-59)

651-K.* (German.) **Metal Bonding With New Adhesives.** H. Winter and H. Meckelburg. *Aluminium,* v. 34, Oct. 1958, p. 596-608.

Composition of thermosetting and thermoplastic adhesives; average joint strength. 155 ref. (K12; Al, Cu, Mg)

652-K.* (German.) **Spatter During Arc Welding.** Friedrich Erdmann-Jesnitzer and Gottfried Pysz. *Schweissen und Schneiden,* v. 10, Aug. 1958, p. 303-311.

Spatter as a rule originates in weld metal pool shortly after passage of material from electrode (0.01-0.001 sec.). Phenomenon compared to "cooking" of steel. Attempt is made to relate spattering with gas absorption on electrode side since it is more pronounced in bare-wire electrodes. 17 ref. (K1)

653-K. Wide-Gap Brazing Alloy Assembles Engine Rings. R. C. Kellner. *American Machinist,* v. 102, Nov. 3, 1958, p. 98-99.

Join high-temperature Ni-base alloys with high Ti and Al content. Hold blades to rings in nozzle diaphragms for gas-turbine engines. (K8, W11m; *Ti, Al,* Ni, 17-57)

654-K. Slope Control Makes Better Welds. John Kelly. *American Machinist,* v. 102, Nov. 3, 1958, p. 105-107.

Conditioning the work both before and after welding current is applied. During the up-slope period, the surface is prepared by increasing the heat gradually. During down-slope, the weld is annealed. (K3, K9p, K9q)

655-K. Standard Welding Symbols. *American Welding Society,* AWS A20-58, 87 p., 1958. $3.

(K1, K2, K3; 15-61)

656-K. Special Spot Welding Methods. *Brown Boveri Review,* v. 45, May 1958, p. 223-235.

Methods suitable for batch and mass production of steel components. (K3n; ST)

657-K. How Stainless Piping Was Welded for an Atomic Sub. *Industry & Welding,* v. 31, Oct. 1958, p. 62, 63, 98, 99.

(K1, T22; SS, 4-60)

658-K. Techniques for Fabricating Magnesium. *Industry & Welding,* v. 31, Oct. 1958, p. 64-65, 96.

Rapid oxidation, preweld cleaning, heating before forming, danger of fire are problems encountered. (K1d; Mg-b, 4-53)

659-K. Resistance Welding: a Fast Way to Join Dissimilar Metals. *Industry & Welding,* v. 31, Oct. 1958, p. 66-67, 86.

Spot and projection welding join Cu, steel and phosphor bronze to bimetallics. (K3n, K3q; Cu, ST)

660-K. Tungsten Inert Arc Welding. Pt. 1. Frank Kuncz. *Industry & Welding,* v. 31, Oct. 1958, p. 71-72, 118-119.

Chemical analysis of electrodes, current chart, shielding gases and process. (K1d, W29h; W, Th)

661-K. Stored Energy Percussive Welding Joins Steel Studs to Plated Trim. *Industry & Welding,* v. 31, Oct. 1958, p. 74-75.

High heat and great speed of process joins materials without damaging plated surface. (K3a; ST, *Cr*, 8-62)

662-K. Blind Rivets Assemble Faster. *Iron Age,* v. 182, Nov. 13, 1958, p. 138-139.

Rivets are indispensible for fastening of hidden joints and also speed assembly of those easily accessible. (K13n)

663-K. Vinyl Metal Laminates. Robert J. Fabian. *Materials in Design Engineering,* v. 48, Oct. 1958, p. 98-102.

Laminates are produced in six basic steps—metal preparation, application of adhesive, solvent evaporation, heat reactivation, vinyl application, cooling. (K11)

664-K. High-Temperature Brazing Methods. John Starr. *Pacific Factory,* v. 90, Aug. 1958, p. 26-27.

Typical materials being brazed for high-temperature service are Ti alloys, Inconels, Multimet, Haynes Alloy 25, and Armco 17-7PH stainless steel. Brazing alloys include high-Ni, Ag-Mn, Mn-Ni, Pd-Ag and Pd-Ni materials. (K8; SGA-f, Ni-b, Ti-b, SS)

665-K. Six Basic Design Suggestions for Brazed Honeycomb Sandwich. Floyd F. Rechlin. *SAE Journal,* v. 66, Oct. 1958, p. 56-63.

(K8; 7-59, 17-51)

666-K. CO_2 Welder Makes Casting Repair Easier. J. J. Chyle. *Steel,* v. 143, Nov. 17, 1958, p. 110-112.

Gas shielding eliminates slag removal, speeds rate of metal deposit. cuts labor costs. (K1, K2m, E26, 18-72)

667-K. Defining Quality of Welding Workmanship. H. J. Bukowski. Paper from "Conference on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 53-57.

Proof testing, hydrostatic testing, visual examination evaluated as indication of quality. (K-general, S13)

668-K. Development of Welding for Engineering Fabrication. J. H. Humberstone. Paper from "Conference on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 1-8.

Previously abstracted from original. See item 89-K. 1958. (K-general, A2, 17-57)

669-K. Ship Structure. E. M. MacCutcheon. Paper from "Conference on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 139-146.

Welding of ships' hulls. (K-general, T22g)

670-K. Survey of Welding Codes; Standards and Specifications for Welding. Arthur Kugler. Paper from "Conference on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 39-46.

Qualification testing must take into account service conditions, general design and layout, materials, detailed design, joint welding procedures, welding sequence, qualification, supervision and inspection. (K-general, S22)

671-K. Use of Steel Castings in Engineering Weldments. N. N. Breyer. Paper from "Conference on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 281-293.

When to use castings or welded composite structures. (K-general; ST, 5-60, 7-51)

672-K. Foresee Wider Scope for CO_2 Welding. *Welding Engineer,* v. 43, Nov. 1958, p. 48-50.

Introduction of reactance unit will permit use of lower currents on mild and stainless steels as well as on Al. (K1d, W29a; Al-b, SS)

673-K. Joining of Metals in Solid State by Ultrasonic Vibrations. Yu. I. Kitaigorodskii. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 8, Aug. 1958, p. 88-90. (Henry Brutcher, Altadena, Calif., Translation no. 4401.)

Quality of spot and continuous joints obtained with the use of ultrasonic waves as function of physical properties, surface condition and thickness of metals joined, on the one hand, and the operating conditions of the ultrasonic apparatus, treating time, contact force and contact surface. on the other. Materials used in study were Cu, Al, duralumin and stainless steel sheets. (K6r; SS, Cu, Al-b)

674-K. (German.) **Welding Techniques in the Chemical Industry.** Theodor Ricken. *Industrieblatt,* v. 58, Oct. 1958, p. 433-435.

Symposium including papers on problems arising from new materials and their processing; corrosion and welding techniques; increased requirements for welding paralleling continued developments in industry; safety of welded constructions. (K-general, T29)

675-K. (German.) **Should Metal Parts Be Pressed or Bonded to Plastic Parts?** W. Schafer and H. Stolze. *Plaste und Kautschuk,* May 1958, p. 172-175.

Bonding with epoxide resins given preference to pressing. Practical applications. 6 ref. (K11d)

676-K. (German.) **Influence of Surface Treatment on the Strength of Bonded Metal Joints.** W. Schafer. *Plaste und Kautschuk,* June 1958, p. 219-223.

Behavior of bonding material on the surface. Wetting and adhesive energy. Influence of impurities. Examples for different metals, surface treatments, bonding materials, shear strength of joints. (To be continued.) (K12, L10)

677-K. (German.) **Application of Automatic Welding Procedures.** K. H. Mathias. *Schweissen und Schneiden,* v. 10, Aug. 1958, p. 321-327.

Mathematical formulas used to determine cost of production, cost of installation, productivity of plant and to determine necessary cross section of edges to be joined. 25 ref. (K-general, 17-53, 18-74)

678-K. (German.) **Repair of a Ball Mill by Welding on Large Areas.** G. Kohlhaupt. *Schweissen und Schneiden,* v. 10, Aug. 1958, p. 327-330.

(K1; ST, CI)

679-K. (German.) **Increased Loading Capacity and New Methods in Ship Building.** Raimund Pertusini. *Schweisstechnik,* v. 12, Sept. 1958, p. 117-121.

Welding techniques. (K-general, T22g)

680-K. (German.) **How to Avoid Intercrystalline Corrosion in Welds of Nonstabilized Steels, Type 18-8 Cr-Ni.** Josef Nemec. *Schweisstechnik,* v. 12, Sept. 1958, p. 121-126.

Experimental welding of C-Mn-Si-Cr-Ni-Mo-Ti-P-S steels and carbon steels immediately followed by water cooling. Intercrystalline corrosion tested with solution of 10% H_2SO_4, 10% $CuSO_4$ + $5H_2O$. 7 ref. (K-general, R2h; SS)

681-K. (German.) **Novel Soldering and Tinning Process.** *Technik und Betrieb,* v. 10, July 1958, p. 105.

Tinning and soldering using "Epatam" solder. (K7)

682-K. (German.) **Difficulties in Soldering Copper Sheet.** *Technik und Betrieb,* v. 10, July 1958, p. 106.

Influence of soldering temperature on elastic limit. A decrease of ultimate strength and a slight decrease of the elastic limit with increasing temperature observed. (K7, Q21, 2-61; Cu-b, 4-53)

683-K. (Slovakian.) **Protection Measures Necessary in Welding Exhaust Pipes of Gasoline Motors.** Jaroslav Vodera. *Zvaranie,* v. 7, July 1958, p. 212.

(K-general, A7, T21c)

684-K. (Spanish.) **Equipment for Inert Gas Welding.** *Fusion de Metales,* v. 20, Sept-Oct. 1958, p. 9-11, 14.

(K1d, 1-52)

685-K. (Russian.) **Welding in Chemical Equipment Building.** P. T. Dmitriev. *Svarochnoe Proizvodstvo,* Sept. 1958, p. 1-6.

(K-general, T29)

(*) Articles Available Through Photocopy Service; See Coupon, p. 91.

686-K. (Russian.) **Use of Low-Alloy Refined Steels in Welded Structures.** E. M. Kuzmak and V. S. Milanchev. *Svarochnoe Proizvodstvo*, Sept. 1958, p. 11-15.

Use makes it possible to lessen weight and reduce amount of material. Prevalent practice of welding low-alloy steel without preliminary thermal treatment leads to poor welds. Welds of thermally treated steels are more uniform, stronger and cheaper. 9 ref. (K9p, 2-61; AY)

687-K. (Russian.) **Method for Evaluating Resistance of Steel to Cold Cracking During Welding.** N. N. Prokhorov and Y. L. Kakarov. *Svarochnoe Proizvodstvo*, Sept. 1958, p. 15-18.

All factors determining tendency of steel to formation of cold cracks during welding arise in the process of austenite decomposition. Method of evaluation of cold cracking tendency consists of bending the welded sheet with constant deformation speed. (K9r, N8, 3-68, 8-72; ST)

688-K. (Russian.) **Main Trends in Welding Research at Bauman Technical School at Moscow.** G. A. Nikolaev. *Svarochnoe Proizvodstvo*, Sept. 1958, p. 22-26.

Welding rare metals; automation of welding and cutting of steels and alloys; contact welding; ultrasonic welding and strength of welds. (K-general, A9m)

689-K. (Book.) **Welding Handbook.** 4th Ed., Sect. 2, 1958, American Welding Society, 33 W. 39th St., New York 18, N. Y. $9.

Processes, operation, equipment and bibliographies for gas welding, arc welding, resistance welding. (K1, K2, 11-68)

690-K. (Book.) **Conference on Welding Engineering.** Army Engineer Research and Development Laboratories. *U. S. Office of Technical Services*, PB 131739, Apr. 1957, 462 p. $6.

Papers abstracted separately. (K-general)

L Cleaning Coating and Finishing

758-L.* **An Investigation of the Mechanism of Levelling in Electrodeposition.** S. A. Watson and J. Edwards. *Institute of Metal Finishing, Transactions*, v. 34, 1956-1957, p. 167-198.

Levelling power, defined as a function of the deposit thickness obtained at the peaks and the recesses of a standard rough surface, is measured in Ni plating solutions. Effects of levelling power and cathode potential of variations in current density and in the concentration of a variety of addition agents. Cathode efficiency determined and distribution of addition agents investigated under selected levelling conditions. (L17b; *Ni*)

759-L.* **A Contribution to Knowledge of the Cathode Polarization Phenomena of Nickel.** R. Piontelli and G. Serravalle. *Institute of Metal Finishing, Transactions*, v. 34, 1956-1957, p. 293-316.

Cathodic behavior of Ni in various solutions (chloride, sulphate, chloride-sulphate, sulphamate, perchlorate, fluoborate) buffered with boric acid in different conditions of pH, current density and temperature. 15 ref. (L17, P15; Ni)

760-L.* **Applications for Alkaline Descaling Cleaners.** Edward R. Jorczyk. *Metal Finishing*, v. 56, Oct. 1958, p. 46-48, 55.

Typical production applications are removing heat treat scale from ferrous sheet metal parts other than stainless steel; removing carbon smut from partially Cu-plated ferrous alloy parts that are carburized; removing smut from parts that are stripped of Cu plate; cleaning parts prior to plating; removing rust from machined parts. (L12k)

761-L.* **Electropolishing. Pt. 3. Less Commonly Electropolished Metals.** John F. Jumer. *Metal Finishing*, v. 56, Oct. 1958, p. 67, 70.

Procedures and solutions for electropolishing cadmium, gold, magnesium, platinum, silver, tantalum, titanium, tungsten, zinc and zirconium. (L13p; Cd, Au, Mg, Pt, Ag, Ta, Ti, W, Zn, Zr)

762-L.* (German.) **Testing of Rhodium Baths by the Hull Method.** S. Dorner and L. Froels. *Metallwaren-Industrie und Galvanotechnik*, v. 49, July 1958, p. 299-305.

Rhodium is well suited for electroplating, and use in production of jewelry and precision instruments is increasing. Plating is similar to procedure in electroplating with other metals. Results of tests made with different metallic admixtures to baths. Damaging effects of Au, Cu, Ag, Sn and Zn. 4 ref. (L17; Rh)

763-L.* **Multi-Color Finishes Applied Electrostatically.** John Sedlacsik, Jr. *Industrial Finishing*, v. 34, Oct. 1958, p. 22-24, 28, 30.

System utilizes an array of airless variable-speed centrifugal atomizers for blending and atomizing different single solid color coating materials which are individually supplied at controlled rates to the inner bottom surface of each atomizer head by separate, variable-output, positive-feed displacement pumps to produce smooth multicolor effects. Process is capable of coating practically any products that can be moved through painting zone by conveyor. (L26n)

764-L.* **The Hydra-Spray Process of Applying Paint Materials.** John P. McAdams. *Industrial Finishing*, v. 34, Oct. 1958, p. 58-60, 62.

In this system, compressed air drives the pump, but it doesn't spray the paint. No compressed air reaches the spray gun; only thing that's fed to spray gun is paint under high pressure. This high pressure (1000 to 2000 lb.) is obtained from a reciprocating, double-acting air motor that is mechanically coupled by a connecting rod to a reciprocating, double-acting pump. (L26n)

765-L.* **Electrodeposition of Gold and Platinum by Sel-Rex Processes.** *Industrial Finishing (London)*, v. 10, Sept. 1958, p. 37-38.

Gold plating can be applied for decoration and protection. Sel-Rex process is suitable for still and barrel plating. Important application is the plating of Cu printed circuits to protect them against corrosion and wear. (L17; Au, Pt)

766-L.* **Electroplating Improves Properties of Iron Powder Articles.** *Industrial Finishing (London)*, v. 10, Sept. 1958, p. 50, 52, 54.

Performance of various electroplates on iron powder parts. High-density and resin-impregnated parts have better corrosion resistance after plating than low-density parts. Copper in resin-impregnated parts reduces corrosion resistance. Acid sulphate bath produces better Cu deposits than a copper cyanide solution. Nickel sulphamate and zinc sulphate baths produce the best Ni and Zn plates. (L17; Fe, 6-72)

767-L.* **New Way to Descale Titanium.** *Products Finishing*, v. 23, Oct. 1958, p. 42-44.

Electrolytic process called "Ti-Brite". Formulation of the bath; hydrofluoric acid; nitric acid; sulphuric acid; water ferrous sulphate. The Ti article to be descaled is made the cathode and direct current (6 to 36 volts) is passed for 1-3 min. from this cathode to a Ti or ferrous metal anode. Current is reversed for 1-3 min. and then reversed again to pass current in the same direction first used. Treatment is continued until visual inspection shows that scale removal is such that remaining scale will be taken off in the rinse with a minimum of hand labor. (L13n; Ti)

768-L.* **Properties and Uses of Catalytic Coatings.** John F. Howe. *Products Finishing*, v. 23, Oct. 1958, p. 45-47.

Catalytic protective coatings are combinations of vehicles and rust-inhibitive pigments with a catalytic agent. They make possible a chemical treatment and rust-inhibitive coating in one application. Excellent adhesion and wetting properties, heat resistance, salt spray resistance and acid and alkali resistance. Used for all types of metal such as steel, stainless steel, Zn, Cd, Sn, Al, galvanized iron, Mg. (L29, R10b)

769-L.* (Czech.) **Anodes for Chromium Plating With Baths Containing Hydrofluoric Acid.** Otakar Mudroch. *Korose a Ochrana Materialu*, v. 2, no. 3-4, 1958, p. 45-48.

Experiments with anodes of different material and steel cathodes at 20-30° C. and with 10 amp. per sq. dm. anodic density. Pb-Sn alloy anodes, Pb-Sb and Pb-Sn recommended for anodes as well as for both tank linings. (L17, W3h, 17-57, Pb, Sn, Cr)

770-L. **Self-Adhesive Tapes in Metal Finishing.** *Electroplating and Metal Finishing*, v. 11, Sept. 1958, p. 303-308.

Types available and their principal characteristic. (To be concluded.) (L-general, R10f)

771-L. **'Ghosts' in the Saddle Department.** Kerry Sloane. *Electroplating and Metal Finishing*, v. 11, Sept. 1958, p. 323-324.

Elimination of gray streak in the enamelled finish of bicycle frames. (L26n, 9-71)

772-L. **Want Longer Part Life? Try Hardsurfacing.** *Metalworking*, v. 14, Oct. 1958, p. 10-11.

Mild steel dust collector protected with ¼-in. welded hard surfacing is expected to last 6-8 times longer; create fewer maintenance problems. (L24; CN)

773-L.* **The Influence of Aluminum, Lead and Iron on the Structure and Properties of Galvanized Coatings.** J. J. Sebisty and J. O. Edwards. *Dept. of Mines and Technical Surveys, Ottawa, Canada, Mines Branch*

Research Report no. R5, Mar. 1958, 47 p. $.25.

Influence of Al and Pb additions in iron-saturated baths on the structure and properties of galvanized coating prepared by dry galvanizing technique. Different levels of Al and Pb, and ranges of bath temperature and immersion time were studied using two grades of sheet steel. Statistical evaluation indicated that immersion time and Al content had most significant effect on coating rate, steel rate loss, Fe content and alloy growth in coating and in adherence of coatings. Pb content was most significant variable affecting surface appearance of coating. Accelerated corrosion tests suggest Al, and to a lesser degree Pb, had significant effect on promoting "white rusting" of coatings. 9 ref. (L16, 2-60; ST, *Zn, Al, Pb, Fe*)

774-L.* A Study of Surface Carbides, Differential Steel Attack and Pore Formation in the Galvanizing Process. J. J. Sebisty. *Dept. of Mines and Technical Surveys, Ottawa, Canada, Mines Branch Research Report no. R6*, Mar. 1958, 18 p. $.25.

Observations on effect of massive carbide inclusions present in steel sheet on the structure of galvanized coatings. Behavior of carbides found to be dependent on temperature and Al content of galvanizing baths. Variation in galvanizing attack on two supposedly similar steels was found to be related to type and degree of surface working. Pore defects on the surface of coatings appear to be related to gas evolution accompanying flux reaction. (L16, 9-71; ST, *Zn*)

775-L.* New Protective Finishes for High-Temperature Resistance Materials. Alfred F. Hofstatter. *Product Finishing*, v. 11, Oct. 1958, p. 52-58.

Protective finishes for high-temperature materials include metallic coatings, paints and ceramic coatings. Base materials include Al, Mg and Ti alloys, alloy steels, stainless steels, Ni and Co alloys and Mo. Depending on the conditions of use, some of these may need no protection, while other conditions may call for some form of protective coating. (L-general; SGA-h)

776-L.* (Russian.) **Protective Coatings for Heat Resistant Alloys.** V. A. Parfenov. *Metallovedenie i Obrabotka Metallov*, June 1958, p. 33-37. (Henry Brutcher, Altadena, Calif., Translation no. 4251.)

Chromium plating 0.1 mm. thick on samples made of EI437B alloy increased their heat resistance by 16% at 750°, and 0.1-0.2 mm. thick plating on alloy EI 617 by 14% at 800°. Since electrolytic layers recrystallize at 800°, Cr plating is not recommended above that temperature. Enameling increases heat resistance of alloy EI 617 by 15% at 800°. For greater effectiveness enamel should be baked on the parts at low temperatures. 5 ref. (L17, L27; SGA-h, *Cr*)

777-L.* (Russian.) **Wear Resisting Chromium Plating of Worm Gears.** E. F. Zommer. *Vestnik Mashinostroeniya*, v. 38, Sept. 1958, p. 54-56.

Experiments conducted with aim of replacing bronze with cast iron. Specimens coated with porous and nonporous chromium gave adequate wear resistance Porous Cr gives best results. Cr plated gray iron is a good substitute for bronze. 4 ref. (L17, T7a, 17-57; CI, 18-12, *Cr*)

778-L. Influence of the Working Method on Growth and Various Characteristics of the Oxide Layer When Anodically Oxidizing in Sulphuric Acid. D. Lenz. *Aluminium*, no. 3, Mar. 1956, p. 126-135. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB39.)

(L19; Al-b)

779-L. Science for the Coatings Technologist. Pt. 11. Paint Additives: Driers and Anti-Skinning Agents. E. S. Beck. *Metal Finishing*, v. 56, Oct. 1958, p. 56-60.

Cobalt, lead, manganese, calcium, iron and zirconium used as drier metals. (L26; Co, Pb, Mn, Ca, Fe, Zr)

780-L.* Electropalting Explained—a Course for the Working Plater. Pt. 5. Trichlorethylene Degreasing. H. Hartley. *Product Finishing*, v. 11, Aug. 1958, p. 60-67, 78.

Proper operational methods and safety devices insure against health dangers and unnecessary trichlorethylene wastage. Principles and operations of vapor, vapor-liquid and swill-type tanks. Rates of contamination and irrigation. (L12j)

781-L.* Staining of Copper Sheet and Strip and Its Prevention. W. H. L. Hooper. *Sheet Metal Industries*, v. 35, Aug. 1958, p. 611-613, 619.

Classifies the various types of stains according to their principal chemical characteristics, such as oxide and basic carbonate, sulphate, sulphide and redeposited metallic Cu. Methods of minimizing staining of Cu and their disadvantages. (L12; Cu, 4-53)

782-L.* (French.) **Chemical and Electrochemical Finishing in the Automobile Industry.** R. Vacher. *Corrosion et Anticorrosion*, v. 6, Sept. 1958, p. 318-328.

When decorative effect as well as corrosion protection is desired for steel, Zn alloy, Cu or brass parts, Cr plating is indicated. For Al or Al alloy parts, anodic oxidation, including proper surface preparation, is sufficient. When no decorative effect is desired, Zn, Cd or Sn plating, or phosphate coating, provides corrosion protection. Surface preparation, bath characteristics, properties conferred on metal surface by these processes. (L17, L19, L14b, T21, 17-57)

783-L.* Organic Coatings for Zinc Surfaces. P. Costelloe and E. Page. *Institute of Metal Finishing Bulletin*, v. 8, Summer 1958, p. 107-114.

Current commercial paint resins and their performances on Zn surfaces. Primers and wash primers and the effect of certain pigments. Formulation of chromate and phosphate passivation. (L26; Zn)

784-L.* Notes on the Application of Self Mottle Ground Coats. A. T. Issitt. *Product Finishing*, v. 11, Aug. 1958, p. 48-54.

Coats which are a mixture of regular or acid-resisting ground coat enamel and a super opaque Ti cover coat enamel give good resistance to thermal shock and abrasion. When a high proportion of white enamel is used in the mixture a Ni dip undercoat will give the ground coats good adhesion. Pickling, Ni dip solutions, cleaning, dipping equipment and layout, methods of dipping and procedures in applying these coats. (L27)

785-L.* (French.) **Corrosion Protection of Bridges and Viaducts of French National Railways.** Bernard Thomas. *Corrosion et Anticorrosion*, v. 6, Sept. 1958, p. 288-291.

Standard treatment for all metal structures of French lines consists of blast cleaning with crushed silica, brush application of a coat of pure red Pb, followed by one or two coats of heavy paint containing micaceous iron oxide. New anticorrosion paints and techniques are being tested, but results have been discouraging in test applications where atmospheric humidity and impurity are high. (L10c, L26n, T26p; ST)

786-L.* Architectural Anodizing. *Light Metals*, v. 21, Oct. 1958, p. 328-329.

Recommendations for finishes of satisfactory appearance and long life are based on research into anodizing procedures, on weathering over prolonged periods in different environments and on the recently issued specifications for anodic films. Aluminium alloys used, texture, anodizing conditions, coloring and sealing. (L19, T26n, 17-57; Al)

787-L. An Engineering Study of Vacuum Metallizing. *U. S. Office of Technical Services*, PB 131542, Dec. 1956, 32 p. $1.

Feasibility of using the economical vacuum metallizing process in lieu of electroplating for coatings on ordnance material, with emphasis on electrical components. Rapid production of extremely thin metallic films on glass, metals and plastics. Al, Cr, Ti and Ni can be deposited in thin coatings (to 0.0001 in.) by use of W wire filaments. Multiple strands of W wire were used to produce thicker coatings but difficulties arose concerning the high temperatures required and the tendency of the charge metals to alloy with the filament material. L23, 1-73)

788-L.* Preparation and Properties of Clean High-Area Metal and Alloy Evaporated Films for Use in Surface Studies. S. J. Stephens. Paper from "1957 Fourth National Symposium of Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 34-37.

Preparation of films of Pd, Au and 60-40 and 80-20 Au-Pd alloys. Films characterized by chemical analysis, X-ray and electron diffraction studies and surface area measurements. Oxygen uptake by evaporated films. (L25j, 1-73, M22; Pd, Au, 14-62)

789-L.* Evaporation Mode of Certain Vacuum Metal Distallation Source Configurations. L. E. Preuss and C. E. Alt. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 47-72.

Technique permitting qualitative survey and quantitative assay to be made of the distillation rate from the various regions of a simple metal evaporation source. Image formation achieved by condensation of radioactive metal distilland at image plane of a simple vacuum distillation camera. Autoradiographic process utilized to intensify metal image. The influence of surface tension, wetting, filament temperature and system pressure on distillation geometry studied for Au, Cr and W. (L25j, 1-73)

790-L.* Metallizing of Flexible Substrates. Phillip J. Clough. Paper from

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

"1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 136-137.

Problems encountered in continuous metallizing of paper or plastic sheet material. Use of carbon-base crucible and evaporation of Al at high steady rate for periods of hours. Conditions for minimum heat transfer to substrate. Geometric arrangement of source to assure uniformity of coating. (L23, 1-73; *Al*)

791-L.* Vacuum Metallizing on Plastics. T. J. LaBounty. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 138-142.

Plastics commonly metallized and characteristics that are important to commercial metallizer. Problems commonly encountered.
(L23, 1-73; NM-d)

792-L.* Continuous Evaporation of Refractory Metals by Electron Bombardment Without Using Support Materials. Norman Milleron. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 148-149.

Mo and Ti wires evaporated at rate of 0.05 g. per min. Wires bombarded with electrons after being fed through cool Cu tips. The cool tip permits a stable continuously evolving molten ball of metal to be held by surface tension on the parent wire. 8 ref.
(L25g; Mo, Ti, 4-61)

793-L.* Electroplated Metals on Niobium. John G. Beach. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 81-88.

Plating baths and conditions for plating Fe, Ni, Cr, Cu, Au and Pt on Cb. Adherence of as-plated metals; heat bonding at 1300° F.; diffusion characteristics of Cr or Cu and Fe on Cb at 1500° F. The as-plated adherence of Fe was improved by heat bonding. At 1500° F. Fe plate ultimately alloyed with Cb and formed a weak intermetallic alloy layer. 5 ref. (L17, Cb)

794-L. Sprayed Aluminum Reduces Compressor Clearances. Loyd E. Batchelor. *American Machinist*, v. 102, Oct. 20, 1958, p. 140-141.

Automatic metal spraying process that minimizes the blade-to-housing clearance in turboprop aircraft engine compressors.
(L23, L10c, T24b; Al, 18-74)

795-L. Lead Base Paints in Corrosion Control. N. J. Read. *Corrosion Prevention and Control*, v. 5, Sept. 1958, p. 61-64, 66-67.

(L26n; Pb)

796-L. Metal Spraying Applications. *Industrial Finishing (London)*, v. 10, Sept. 1958, p. 34-36.

Besides providing a protective coating, metal spraying can be used to build up worn parts such as bearings, hence saving the cost of replacement. (L23, Al, Cr, Ni, Zn)

797-L. Non-Porous Platinum Electroplate in One Operation. *Industrial Finishing (London)*, v. 10, Sept. 1958, p. 39.

Platanex produces a nonporous Pt electroplate, in any practical thickness, directly from the bath in one continuous operation. Fine-grained dull gray finish duplicates exactly the surface plated; offers greater corrosion resistance in high-temperature ranges than Rh plate, at no greater cost. Baths are simple and easy to operate, requiring only addition of replenisher concentrate and water for maintenance. (L17; Pt)

798-L. Fluoride Anodizing Process Replaces Shot Blasting for Magnesium Alloys. *Industrial Finishing (London)*, v. 10, Sept. 1958, p. 56.

Magnesium alloys can be cleaned with little pretreatment. Dimensional losses are small and no difficulties arise even when working to fine limits. (L13n, L19; Mg-b)

799-L. Sulphamic Acid Bath Solves Nickel Plating Problems. *Industrial Finishing (London)*, v. 10, Sept. 1958, p. 58.

Nickel plate from sulphamate acid baths is free of tensile stress and is used in the processes of magazine printing, printed circuits, typewriter components, gramophone records and aircraft parts. (L17a; *Ni*)

800-L. Automatic Parts Washer at Ford Motor Co. Plant. Emil J. Frundel. *Industrial Finishing*, v. 34, Oct. 1958, p. 54, 56.

(L12e, W3e, 18-74)

801-L. Recent Advances in Control Systems for Continuous Processing Lines. C. P. Brooks and J. T. Bradford. *Iron and Steel Engineer*, v. 35, Oct. 1958, p. 129-135.

Improvement of control systems results in easier installation, maintenance; increased flexibility, improved performance of tin-plating installations. (L17, 1-52, 1-61; *Sn*)

802-L. Shot-Blasting Removes Scale Economically. Herbert Chase. *Machinery*, v. 65, Oct. 1958, p. 167-169.

Automatic system handles both sheet and coil stock; blasting both sides simultaneously and then oiling stock before it is stacked or re-coiled. (L10c; ST, 4-53)

803-L. Electroplating Explained. A Course for the Working Plater. Pt. 6. Electricity in the Plating Shop. Pt. 1. H. Hartley. *Product Finishing*, v. 11, Oct. 1958, p. 70-76.

Electricity in the plating shop with special consideration to generation, conversion and general supply arrangements. (L17, W11)

804-L. The Pickling of Copper Wire. Max Straschill. *Wire Production*, v. 7, Apr-June 1958, p. 3, 5-6.

(L12g; Cu, 4-61)

805-L. Hard Gold Plating. A. G. Atanasyants, N. T. Kudryavtsev and V. M. Karataev. *Journal of Applied Chemistry of the USSR*, v. 30, 1957, p. 926-930. (Translation by Consultants Bureau, Inc.)

Electrolyte composition has been found for producing Au-Ni alloy coatings of higher hardness than that of ordinary Au coatings. Optimum electrolysis conditions for deposition of Au-Ni coatings and a method for adjusting the electrolyte composition. (L17a; *Au*)

806-L. Electrochemical Methods for Decorative Surface Treatment of Aluminum Articles. P. V. Shchigolev. *Journal of Applied Chemistry of the USSR*, v. 30, 1957, p. 931-935. (Translation by Consultants Bureau, Inc.)

Procedure for anodizing treatment of electropolished Al in H_2SO_4 solution yields transparent oxide coatings which diminish the luster of Al very slightly. (L17c; Al)

807-L. Investigation of a Thiocyanate Electrolyte for Copper Plating. B. S. Krasikov and A. M. Gvozd. *Journal of Applied Chemistry of the USSR*, v. 30, 1957, p. 1012-1016. (Translation by Consultants Bureau, Inc.)

Recommended as a replacement of the unstable and poisonous cyanide electrolytes for Cu plating of steel. (L17a; *Cu*, ST)

808-L. Hard Zinc. K. Ruttenwit and E. Eichmeyer. *Metall*, v. 10, no. 314, Feb. 1956, p. 106. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1476.)

(L17; *Zn*, 8-62)

809-L. (German-French.) **Classification of Filler Metals for Weld Deposition.** G. M. Blanc. *Zeitschrift für Schweisstechnik*, v. 48, Sept. 1958, p. 246-249.

(L24, W29h)

810-L. (German.) **Protection of Iron and Other Materials With Rubber.** H. Ziegner. *Draht*, v. 9, Sept. 1958, p. 344-346.

Manufacture and use of rubber coatings for Fe, Al and brass. In one process, rubber plates are calendered and bonded together.
(L26r; Fe, Al, Cu-n)

811-L. (German.) **Peen Plating.** H. Blum. *Metall*, v. 12, Sept. 1958, p. 814-816.

4 ref. (L29)

812-L. (Japanese.) **Media for Barrel Finishing.** Wataru Funabashi. *Government Industrial Research Institute, Nagoya Reports*, v. 7, Aug. 1958, p. 624-629.

8 ref. (L10d; NM-j)

813-L.* (German.) **Wire Tinning With and Without a Protective Salt Surface.** *Draht*, v. 9, Aug. 1958, p. 304-306.

Experiments with various tinning baths, especially with increased lead and a salt mixture consisting of 40 parts $NaNO_2$, 7 parts $NaNO_3$ and 53 parts KNO_3. No advantage seen in the use of a protective salt surface because small metal drops penetrate into the salt layer and increase the waste metal.
(L16; ST, *Sn*, 4-61)

814-L.* (German.) **Vacuum Metallizing.** W. Koehler. *Metalloberflache*, v. 12, Sept. 1958, p. 262-267.

Materials suited for this process are glass, ceramics, porcelain, metals, most plastics, textiles, certain leathers, furs and special papers. Less suitable are materials containing larger amounts of softeners or solvents. The vapor pressure of material should be below the depositing pressure of 10^{-4} Torr, and no more gas should be liberated than the pumps can easily exhaust. 25 ref. (L23, 1-73)

815-L.* (Russian.) **Bright Copper Plating From Acid Baths.** V. P. Persianstseva, N. T. Kudryavstsev and V. M. Kalb. *Metallovedenie i Obrabotka Metallov*, v. 4, Sept. 1958, p. 42-46. (Henry Brutcher, Altadena, Calif., Translation no. 4357.)

Process uses an electrolyte containing 250 g. per l. $CuSO_4;5H_2O$;50 g. per l. H_2SO_4; 0.005 g. per l. thiourea and 0.5 g. per l. sodium salt. Current during deposition 10 amp. per sq. dm. Temperature of electrolytes 15-22°. Plating has hardness of 250 kg. per sq. mm. Application of this process to shaped parts has resulted in three-fold increase in productivity of Cu acid

baths and has greatly shortened the time of production cycle of three-layer plate. (L17; *Cu*)

816-L.* (Russian.) **Improving the Surface Quality of Metal by Electro-Mechanical Process.** B. M. Askinazi. *Metallovedenie i Obrabotka Metallov,* v. 4, Sept. 1958, p. 49-53. (Henry Brutcher, Altadena, Calif., Translation no. 4359.)

Use of electromechanical polishing for work hardening machine part surfaces, using as test specimens steel 40Kh, 62 mm. in diameter and 25 mm. long. Some of the specimens were normalized and some quenched in water at 830° followed by annealing at 550°. Results show cleaner, harder surfaces with greatly increased wear resistance. (L13p; ST)

817-L.* **Electro-Polishing Aluminum Reflectors.** J. Nugent. *Electroplating and Metal Finishing,* v. 11, Oct. 1958, p. 352-353.

Use can be made of the gas flow in Brytal treatment to facilitate polishing of Al aircraft reflectors. The same applies to the chemical brightening of Al and to the bright dipping of brass in aqua fortis. Addition of caustic soda prolonged the life of the Brytal solution indefinitely and improved the polish obtained. (L13, L16, L19p; Al-b, Cu-n)

818-L.* **Bright Nickel Plating of Leaded Brasses and Bronzes.** Gianluigi Galli. *Electroplating and Metal Finishing,* v. 11, Oct. 1958, p. 354-355.

Lack of raw materials in Italy and their high costs has led to the employment of metals of inferior quality which cause difficulty in electroplating. Chemical drop tests on brass and bronze determine the presence of certain constituents such as Pb and Al. Condition of the surface, crystal structure and porosity of bronze or brass castings influence the adhesion of bright Ni plating. (L17b; *Ni*, Cu-n)

819-L.* **Vapour Deposited Coatings for Titanium and Titanium Alloys.** Andre Styka. *Industrial Finishing (London),* v. 10, Oct. 1958, p. 41, 43, 45, 47, 49.

Molybdenum was deposited on Ti by the decomposition of Mo hexacarbonyl in 40 different runs. The optimum Co:H_2 ratio seems to be approximately 3:1. Techniques developed produced adherent Mo coatings. Qualitative wear tests show that Mo coatings on Ti and Ti alloys have excellent wear resistance. (L25; Ti-b, *Mo*)

820-L.* **Sprayed High Melting Point Metals.** J. Cauchetier. *Metal Industry,* v. 93, Oct. 31, 1958, p. 374-375.

Mo, Mo alloys, W, Ti and Ta sprayed on sand-blasted, mechanically polished and electrolytically polished mild steel. Oxidation and adhesion of the layers. (L23; ST, *Mo, Ti, Ta*)

821-L. **Hard Facing.** R. T. Phillips. Paper from "Conference on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 179-202.

Characteristics of hard facing rods. Alloys are divided into five broad classifications; low-alloy Fe-base rods; high-alloy Fe-base rods; Co-base rods; Ni-base rods; cast tungsten carbides. (L24, W29h)

822-L.* (French.) **Impregnation of Copper and Copper Alloys With Plastic Materials and Protective Coatings.** Andre Roos. *Cuivre, Laitons, Alliages,* no. 44, July-Aug. 1958, p. 39-47.

Density and mechanical properties of thermoplastic and thermohardening materials; impregnation processes; liquefied plastic coatings, method of application; properties of coatings; applications. 4 ref. (L26p; Cu)

823-L.* (French.) **New Contribution to the Study of the Polishing of Nongeometric Parts.** J. Colange. *Machine Moderne,* v. 52, Aug. 1958, p. 67-69.

Tests of surface roughness of alloy steels and light alloys hand polished with newly developed wheels made of a mixture of rubber and abrasive. Wheels permit surface finishing to mirror polish and are especially useful in manufacture and repolishing of metal molds where precision of dimensions is important. (L10b; NM-j, AY, EG-a38)

824-L.* (French.) **Chemical Nickel Plating.** J. L. Fiedler and J. J. Vanroyen. *Revue du Nickel,* v. 24, July-Aug. 1958, p. 53-63.

Brenner, Kanigen and Niphos processes; processes using hydrazine; properties of coatings; principal applications of these processes. 19 ref. (L28; *Ni*)

825-L.* (German.) **Nonferrous Castings. Products and Processes.** Joachim Muller. *Industrie-Anzeiger,* v. 80, Sept. 12, 1958, p. 30-32.

Applications of alloys based on Al, Mg and Ti. Methods of applying a variety of surface finishes to nonferrous castings by a whole range of mechanical, chemical and electrolytic processes. (L-general, 17-57; Al, Mg, Ti, 5)

826-L.* (German.) **Chemical Surface Treatment of Nonferrous Metals.** H. Keller and F. E. Faller. *Metalloberfläche,* v. 12, May, 1958, p. 145-149.

Literature review of chemical reactions in protective coating of Al by anodic and chemical oxidation, chromate coating of Zn and phosphate coating of Al. Properties of coatings. Pores sealed by treatment with dissolved chromic acid and dichromates or application of oils, waxes and lacquers. Coating processes suited for Cu, Ni, Fe, Cd, Zn, Al and Mg. (L14, L19; EG-a39)

827-L.* (German.) **New Degreasing and Protection Methods for Iron and Steel.** W. Rausch. *Metalloberfläche,* v. 12, Oct. 1958, p. 289-295.

Acid alkali phosphate surface cleaners of 4.8 to 5.8 pH produce a protective film against corrosion. Steps in surface cleaning by spraying: preliminary degreasing, degreasing plus protective coating, water rinsing, rinsing with chromic-acid/phosphoric-acid, drying. 5 ref. (L12, L14b; ST)

828-L.* (German.) **Modern Methods of Lining.** W. Fueller. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 557-559.

Problems of planning and constructing external heated (or cooled) containers with chemical, thermal and mechanical resistant linings; definition of the swelling power of linings. Effect of the swelling power upon the tensions in the coat and the lining under conditions of operation. Possibilities of thin linings in internal heated apparatus with outside heat insulation. (L22)

829-L.* (Russian.) **Formation of Circular Zones on Electrodes in the Electrodeposition of Metals.** V. V. Bondar and Yu. M. Polukarov. *Doklady Akademii Nauk SSSR,* v. 120, no. 3, 1958, p. 552-553.

Zones explained by variations in crystalline structure of the deposit caused by varying current intensity at different distances from the center. Characteristics of zones are influenced by the composition of electrolyte. Different metals and alloys have their special zone patterns. 8 ref. (L17)

830-L.* (Russian.) **Electrodeposited Glossy Tin Plate on Sheet Metal.** A. I. Vitkin and T. P. Plotnikova. *Doklady Akademii Nauk SSSR,* v. 120, no. 3, 1958, p. 588-591.

Tinning process in which liquid Sn is used as an anode, a bath of melted 80% $SnCl_2$ + 5% $ZnCl_2$ + 15% KCl or 80% $SnCl_2$ + 5% $ZnCl_2$ + 15% KF or 75% $SnCl_2$ + 5% $ZnCl_2$ + 5% NH_4Cl_5 + 15% KCl or 64% $SnCl_2$ + 4.5% $ZnCl_2$ + 27% KCl + 4.5% $AlCl_3$ as an electrolyte and the infinite sheet metal strip as a cathode. (L17a; ST, *Sn,* 4-53)

831-L. **Strip Preheat Ends Galvanizing Pot Downtime.** Edward J. Udick and Charles A. Turner, Jr. *Iron and Steel Engineer,* v. 35, Aug. 1958, p. 145-149.

Preheat furnace has improved quality of soft, continuous-coated galvanized steel sheet and reduced equipment maintenance costs. Furnace with duct containing protective gas eliminates strip fluxing and maintains required bath temperature without external pot firing, which results in low Al addition requirements, negligible dross formation and improved coating adherence. (L16; 4-53, ST, *Zn*)

832-L. **Wear and Tear of Enamelled Surfaces.** J. W. G. Pedder. *Metal Finishing Journal,* v. 4, July 1958, p. 259-268.

Titania-based enamels are more abrasion resistant than other enamels, and underfiring increased their resistance. Experiments varying the incident of the shot and thickness of the cover coat of titania-based sheet iron enamel. Abrasion of the stove-enameled surfaces caused the film to disintegrate in flakes, similar to crazing in vitreous enamels; whereas, on the vitreous enameled surfaces, the relatively thinner tops of the bubbles were broken and the remaining structure then bore the force of abrasion with much more resistance. (L27, Q9n)

833-L. **A Review of Zirconium Bath Enamels.** W. A. Ross. *Metal Finishing Journal,* v. 4, July 1958, p. 269-275, 280.

Enamels which are opacified by Zr compounds crystallizing out of the melt during firing. Factors which control the degree of opacity or reflectance and the size of the crystals. Tests made of constituents which have an effect on solubility of the zirconium oxide in enamels, including fluorine, the most important element. Operational information and composition of three typical baths. Properties of Zr and Sb enamels compared. 12 ref. (L27; Zr, Sb)

834-L. **Developments in Steel Shot and Its Applications to Vitreous Enameling.** D. W. S. Hurst and J. Bradshaw. *Metal Finishing Journal,* v. 4, July 1958, p. 276-280.

New metallic abrasives are genu-

(*) Articles Available Through Photocopy Service; See Coupon, p. 91.

ine steel. Formerly, abrasives have always been manufactured from chilled cast iron. Shot-blasting machinery, typical of those used in the vitreous-enameling industry, must be changed when using this new abrasive. Steel shot increased the number of successfully enameled castings 8%. (L10c, L27, W2a, ST)

835-L.* (Japanese.) **Study of Dispersion Coating of Polytrifluorochloroethylene.** Kazuo Kato and Hideo Nagasaka. *Metal Finishing Society of Japan, Journal,* v. 9, July 1958, p. 252-256.

Considers change of shape of fused particle during baking. Mechanism of film formation and adhesiveness of film for dispersion coating of polytrifluorochloroethylene on metals. Strongly adhesive coatings obtained on Al and steel pretreated by grit blasting. Adhesiveness was low on Cu alloys unless they had been plated with Cr or Ni. (L26p; Al-b, ST)

836-L.* (Japanese.) **Relation Between Surface Potential of Metals and Adhesive Property of Organic Coatings. Pt. 2. Effect of the Phosphoric Acid Treatment of Aluminum on Its Surface Potential and Adhesion of Organic Coatings.** Bunnosuke Yamaguchi and Hirohiko Hattori. *Metal Finishing Society of Japan, Journal,* v. 9, July 1958, p. 257-260.

Surface potential of Al decreased and adhesion of organic coatings increased when the metal surface was treated with a mixture of phosphoric acid and ethyl alcohol. (L26p, L14b; Al-b)

837-L.* (Japanese.) **Diffusion-Anneal of Aluminum-Sprayed Iron and Steel.** Takashi Yamaguchi, Hideo Nagasaka and Takeshi Takei. *Metal Finishing Society of Japan, Journal,* v. 9, July 1958, p. 260-266.

Metallographic investigation of effect of various factors on the formation, structure and state of the diffusion layer obtained by heating Al sprayed on iron and steel. Structure and state of diffusion layer were essentially dependent on time and temperature of annealing and thickness of sprayed layer. Porosity and poor adhesion of the sprayed layers affected unformity of the diffusion layer. Effect of a sealer was advantageous when the sprayed Al layer was less than 0.2 mm. thick. 10 ref. (L23, J23, N1h; *Al*, Fe, ST, 9-68)

838-L. Titanium Gets Glass Coat. *American Machinist,* v. 102, Aug. 25, 1958, p. 88.

Ti sheets are protected from contamination by a water-soluble glass coating that is sprayed on before the sheets go into the heat treating furnace. (L26c, Ti, NM-f42)

839-L. Di-Phase Cleaning and Electrostatic Spraving for the Protection of Slotted Angle. *Corrosion Prevention & Control,* v. 5, Oct. 1958, p. 61-62.

(L10h, L26n)

840-L. Deburring With Walnut Shells. Dean Rockwell. *Die Casting Engineer,* v. 2, Sept. 1958, p. 11.

Shells have high abrasive quality, removing burrs and flashings well, but without peening or distorting surface of part. (L10c; NM-b, NM-j, 5-61)

841-L. Finishing Kleenacage Bird Cages. M. C. Dowdall. *Electroplating and Metal Finishing,* v. 11, Oct. 1958, p. 347-350.

Automation in electroplating. (L17, T10, 18-74)

842-L. Protection Against Corrosion. Survey of Available Materials. *Food Manufacture,* v. 33, Oct. 1, 1958, p. 411-415.

Rubber-based paints, protective finishes, epoxy resin paints, plastic linings. (L26, R-general)

843-L. New Method for Etching Copper. O. D. Black and L. H. Cutler. *Industrial and Engineering Chemistry,* v. 50, Oct. 1958, p. 1539-1540.

Cupric ion-acid process offers advantages over ferric chloride in the etching bath. (L13q; Cu)

844-L. Coatings Boost Metals Into High Heat Ranges. John V. Long. *Industrial Laboratories,* v. 9, Sept. 1958, p. 137-144.

Ceramics provide a degree of resistance to acids and bases, inhibit oxidation and intergranular corrosion, increase fatigue life, prevent carburization, resist attack by molten Zn and Al, modify surface emissivity or reflectivity, and maintain base material strength for longer periods in high-temperature environments. (L27; SGA-h)

845-L. Mechanized Valve Surfacing With the Oxy-Acetylene Flame. J. F. Barnes. *Industry & Welding,* v. 31, Oct. 1958, p. 81-82, 88.

Porosity, cracking and rough surfaces were eliminated. (L24, T7b; Co-b)

846-L. Light-Fastness of Organic Dyes on Anodized Aluminum. R. C. Spooner. *Metal Finishing,* v. 56, Nov. 1958, p. 48-53, 61.

16 ref. (L19; Al-b, 8-73)

847-L. Finishing Zinc Base Die Castings. Lester Spencer. *Metal Finishing,* v. 56, Nov. 1958, p. 58-61.

(To be continued.) L10; Zn-b, 5-61)

848-L. Chromium Plating on Sprayed Metal. R. de Buyer. *Metal Industry,* v. 93, Oct. 31, 1958, p. 373-374.

(L17; *Cr*, CI, 8-67)

849-L. Power Brushing for Finishing Without Burrs. *Tool Engineer,* v. 41, Nov. 1958, p. 110-112.

Power brushing eliminates maching marks and burrs which are sources of stress concentrations. (L10e)

850-L. Ultrasonic Cleaning. Pt. 1 and 2. Genrokuro Nishimura and Seiken Shimakawa. *University of Tokyo, Faculty of Engineering, Journal,* v. 25, Mar. 1958, p. 262-274.

(L10f)

851-L. Electrolytic Regeneration of Sulphuric Acid Iron Pickel Solutions. H. Hohn, E. Pfitzer and G. Jangg. *Beiztechnik,* v. 6, no. 10, 1957, p. 109-113. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1417.)

(L12g)

852-L. Influence of the Method of Casting Aluminum on the Distribution of the Impurities and the Appearance After Anodic Oxidation. H. Richaud. *Revue de Metallurgie,* v. 51, no. 1, p. 13-15. (Also in *Revue de l'Aluminium,* v. 33, Nov. 1956, p. 1039-1043.) (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB1.)

(L19, 3-69, E-general; Al-b)

853-L. Microstructure of Low-Carbon Steel Developed by Electropolishing and Electroetching. B. S. Kasatkin. *Zavodskaya Laboratoriya,* v. 24, *no. 7, 1958, p. 842-843.* (Henry Brutcher, Altadena, Calif., Translation no. 4345.)

(L13, M27; CN-g)

854-L. (Danish.) **Corrosion Protection of Steel Structures, Railroad Bridges.** Arne Jeppesen. *Ingeniren,* v. 67, July 1958, p. 405-426.

Surface cleaning methods, hot plating with Zn, metal spraying, painting with Zn and other paints. 11 ref. (L-general, T26p; ST)

855-L. (German.) **New Cleaning and Finishing Processes.** A. Hohmann. *Giesserei-Praxis,* no. 9, May 10, 1958, p. 169-172.

Sprue removal by flame cutting and grinding; barrel and sand-blast cleaning of castings, barrel polishing, roto-finishing. (L10c, L10d, E24; G18, G22)

856-L. (German.) **Investigations on the pH-Value of Nickel Dip Baths.** L. Bosolorf and K. Muller. *Metalloberflache,* v. 12, May 1958, p. 150-151.

(L17a; Ni)

857-L. (German.) **Modern Vacuum Metallizing Equipment for Production and Research.** H. Bumm. *Metalloberflache,* v. 12, Sept. 1958, p. 273-277.

(L25)

858-L. (German.) **Process of Vacuum Metallizing.** W. Reichelt. *Metalloberflache,* v. 12, Sept. 1958, p. 278-288.

12 ref. (L25)

859-L. (German.) **Automatic Apparatus for Testing Cleansing Power of Solutions.** G. Wildbrett. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 521-524.

Apparatus tests the cleaning solutions automatically, rinses the sheet specimens with water and dries them in a current of warm air. (L12)

860-L. (Italian.) **Synthetic Elastomers in the Struggle Against Corrosion.** E. S. Wouteakis. *Vernici,* v. 14, May 1958, p. 403-405.

(L26p)

861-L. (Russian.) **Mechanism of Anodic Dissolution of Magnesium.** B. N. Kabanov and D. V. Kokoulina. *Doklady Akademii Nauk SSSR,* v. 120, no. 3, 1958, p. 558-561.

4 ref. (L19; Mg-b)

862-L. Phosphating Treatments. A Comprehensive Patent Literature Survey. Pt. 7. Ervin C. Tinsley. *Metal Finishing,* v. 56, Oct. 1958, p. 72-73, 82.

Brief annotations covering 35 U. S. patents. (L14b, 11-59)

863-L. Science for Electroplaters. Pt. 41. Amino Acids. L. Serota. *Metal Finishing,* v. 56, Oct. 1958, p. 74-76.

(To be continued.) (L17a)

864-L. Vibratory Finishing. *Precision Metal Molding,* v. 16, Oct. 1958, p. 69.

Through the proper application of vibratory motion, barrel finishing, without rotation, can be speeded up markedly. (L10d)

865-L. Job Shop Painting of Die Castings. *Precision Metal Molding,* v. 16, Oct. 1958, p. 72-73.

Electrostatic spray units applied to Zn and Al die castings. (L26; 5-61, Al, Zn)

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

866-L. Industrial Electrodeposition of Zinc on Steel Sheet. Principal Advantages and Range of Application. G. Pieltain. *Corrosion et Anticorrosion,* v. 14, no. 7, 1956, p. 233-240. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. INSDOC-2248.)

Previously abstracted from original. See item 649-L, 1956. (L17; *Zn,* ST)

867-L. Cold Zinc, a New, Remarkable Surface Protection. I. C. Fritz. *Werkstoffe und Korrosion,* v. 6, Nov. 1955, p. 521-523. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1475.)

Previously abstracted from original. See item 214-L, 1956. (L15; *Zn*)

868-L. Aluminum Coating of Iron and Ferrous Metals. L. Grand. *Revue de l'Aluminium,* no. 239, Jan. 1957, p. 63-73. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB39.)

Previously abstracted from original. See item 144-L, 1957. (L15; Fe, *Al*)

869-L. Anodic Potential of Steel as a Function of the Composition of the Electrolyte Used in Electrochemical Polishing. N. P. Fedot'ev and S. Y. Grilikhes. *Zhurnal Prikladnoi Khimii,* v. 30, 1957, p. 233-239. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-65J17R.)

(L13p; ST)

870-L. Polarization Method of Smoothing in the Electrolytic Polishing of Metals. S. I. Krichmar. *Doklady Akademii Nauk SSSR,* v. 100, no. 3, 1955, p. 481-484. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 4-4378.)

(L13p)

871-L. (Italian.) **Specifications of an Electroforming Plant. Pt. 3.** L. Marzano. *Galvanotecnica,* July 1958, p. 169-174.

(L18, W10a)

Metallography

Constitution and Primary Structures

547-M.* The Constitution of Thorium Alloys. F. A. Rough, Arthur A. Bauer and H. A. Saller. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 316-351.

Data for the following alloy systems: Th-Al; Th-Be, Th-B, Th-C, Th-Cr, Th-Cu, Th-Au, Th-Hf, Th-Pb, Th-Ni, Th-Nb, Th-Se, Th-Ag, Th-Ti, Th-V, Th-U, Th-Zr, Th-Bi, Th-Ca, Th-Ce, Th-Fe, Th-Mn, Th-Mo, Th-W, Th-Zn and Th-Ta. 78 ref. (M24; Th)

548-M. (Chinese.) **Formation and Development of a Secondary Structure in Aluminum Crystals Deformed at High Temperatures.** Liu I-khuan' and Tso Tzsutzsun and Uli Sieubao. *Acta Physica Sinica,* v. 12, no. 6, 1956.

Formation of a secondary structure in Al on deformation at high temperature studied by X-ray and metallographic methods. Single crystal and polycrystalline specimens of 99.67% pure Al were subjected to stretching at 200-630° C. at various speeds. Formation of the secondary structure is a result of deformation of the crystalline structure. Grain size of the secondary structure depends on temperature and speed of deformation; lowering the speed of deformation and increasing temperature causes a coarsening of the grain of the secondary structure. (M27c, 3-68; Al)

549-M. (Chinese.) **Investigations of the Lithium-Carbon System.** P. I. Fyodorov and Su Myan'-Tszen. *Khusiue Siuebao,* v. 23, no. 1, 1957, p. 30-39.

System within the limits Li-Li_2C_2 studied by thermal and X-ray structural analyses. Alloys were prepared and cooling curves recorded in an argon atmosphere. A eutectic is formed at 1% C and a temperature of 165° C. By determining the boiling points, the vapor pressure of pure Li and of alloys containing up to 15% C at 790-950° C. was found. At higher temperatures the liquidus was determined by the vapor pressure isobars. Li_2C_2 has some polymorphic modifications with transformation temperatures at about 410, 440 and 560° C. (M24b; Li, C)

550-M.* (French.) **Lamellar Structure of a Thin Film of the Eutectic Alloy of Aluminum and Copper Observed in the Electron Microscope.** N. Takahashi and K. Ashinuma. *Comptes Rendus,* v. 246, June 23, 1958, p. 3430-3433.

Pronounced lamellar structure was found in eutectic of 33% Cu and 67% Al (by weight) by direct observation by transmission electron microscopy. This structure was observed in all specimens examined, indicating that the ratio of components of this alloy remains invariable both in thin film and in massive state. Transformation due to heating was also observed. (M27d, M21e; Al, Cu, 14-62)

551-M. (Russian.) **Phases of the System Tungsten-Boron.** G. V. Samsonov. *Doklady Akademii Nauk SSSR,* v. 113, no. 6, 1957, p. 1299-1301.

Alloys containing 0.9-81.4 at.% B, obtained by hot pressing, were studied by microhardness, X-ray and metallographic analyses. The following phase zones were found: solid alpha-solution of B in alpha-W (maximum hardness 550-770 kg. per sq. mm.); alpha + gamma (W_2B), extending to 33.3 at. %B, hardness of W_2B 2420 kg. per sq.mm.; with several others. (M24b; W, B)

552-M. (Russian.) **Lattice Parameter of Pure Metallic Vanadium and Effect of Oxygen on Change of Parameter.** M. A. Gurevich, B. F. Ormont. *Fizika Metallov i Metallovedenie,* v. 4, no. 1, 1957, p. 112-114.

Lattice parameter of V obtained by different methods; comparison with results of other investigators. For pure V the value $a - 3.024 + 0.001$ Å is proposed. A table gives the relation of a to the dissolved oxygen content (up to 3.2 at. %). (M26n; V)

553-M. (Russian.) **Metallographic and X-Ray Study of Alloys of the System Antimony-Iridium.** R. N. Kuz'min, G. S. Zhdanov and N. N. Zhuravlev. *Kristallografiya,* v. 2, no. 1, 1957, p. 48-50.

Alloys of chemically pure Sb and Ir were prepared by fusing or sintering under a small positive pressure of argon. Melting points were found by cooling curves recorded on electronic automatic potentiometer and also by the method of drop formation. Possible phase diagram of the system Sb-Ir was plotted. At 615° C. near pure Sb the eutectic reaction takes place. Existence of the compounds $IrSb_3$ and $IrSb_2$ was established. (M24b; Sb, Ir)

554-M. (Russian.) **Phase Diagram of the System Mg-Mn.** D. A. Petrov, M. S. Mirgalovskaya, I. A. Strel'nikova and E. M. Komova. *Trudy Instituta Metallurgii Akademiia, Nauk SSSR,* no. 1, 1957, p. 142-143.

Alloys containing up to about 5% Mn were studied. The solubility of Mn in liquid Mg was determined by thermal analysis. At 850, 790, 760, 710 and 670° C. it is 4.95, 3.83, 3.11, 2.58 and 2.10% respectively. The solubility of Mn in solid Mg was determined by microstructural analysis and microhardness measurement. The non-variant 3-phase reaction at 653° C. was determined as a peritectic. The non-variant point was located at 2.0% Mn. (M24b; Mg, Mn)

555-M. (Russian.) **Structure of Liquid Metals.** I. V. Radchenko. *Uspekhi Fizicheskikh Nauk,* **v. 61, no. 2, 1957, p. 249-276.**

Experimental conditions for X-ray diffraction study of liquid metals, possible errors in obtaining X-ray photographs and their interpretation. Basic results of X-ray and neutron photograph investigations. Critical comparison of work on the structure of Hg, liquid metals with a dense packing of atoms in the solid state (Au, Pb, Ti, In, Cd, Al, Zn) and alkali liquid metals, (Ga, Bi, Ge, Sb, Se, Te, Sn). 101 ref. (M25, M22; 14-60)

556-M. (Russian.) **Investigation of the Copper-Cobalt System.** A. T. Grigor'ev, L. A. Panteleimonov, L. M. Viting and V. V. Kuprina. *Zhurnal Neorganicheskoi Khimii,* **no. 5, 1956, p. 1064-1066.**

Investigation by thermal analysis, microstructure and hardness measurement. Alloys were prepared from electrolytically manufactured materials by melting in alumina crucibles in an electric resistance furnace with Kryptol heater elements under a barium chloride cover, then held in vacuum at 1000° C. for 100 hr. and slowly cooled. No discontinuity in solubility in the molten state was revealed. Peritectical reaction beta + liquidus $\rightleftharpoons$ gamma takes place at 1112° C., the magnetic transformation at 1045° C. and the transformation beta→alpha at 305° C. (M24b, N12; Cu, Co)

557-M. (Russian.) **Phase Transformations in the Iron-Chromium-Vanadium System.** I. I. Kornilov and N. M. Matveeva. *Zhurnal Neorganicheskoi Khimii,* v. 2, no. 2, 1957, p. 355-366.

Investigated by differential thermal analyses, hardness measurement, specific electrical resistance, microstructure and X-ray analysis. The system was investigated along a section which ran through the compositions of the phase compounds Fe-Cr and Fe-V (50 at.% Fe), and along a ray section running from the Fe corner to the Fe-V side. at ratios Cr: V of 1:3, 1:1, and 3:1. (M24c; Fe, Cr, V)

558-M. (Russian.) **Phase Diagram of the Ternary System Ni-Cr-W.** I. I. Kornilov and P. B. Budberg. *Zhurnal Neorganicheskoi Khimii,* v. 2, no. 4, 1957, p. 860-867.

Part of the phase diagram up to 50% Cr and 30% W was studied. The alloys were melted in corundum crucibles under a large layer of basic slag, and subjected to gradual homogenizing anneal at 1200, 1000

and 800° C. By thermal and microstructural analysis, two vertical sections of the system with 10 and 30% W were constructed, and the temperatures of the beginning of crystallization of the alloys of these sections were established.
(M24C; Ni, Cr, W)

559-M.* **Metallographic Polishing.** L. E. Samuels and M. Hatherly. *Australian Institute of Metals, Journal,* v. 3, Aug. 1958, p. 111-123.

Principles of modern methods. 65 ref. (M20p)

560-M.* **Etching.** B. D. Cuming and A. J. W. Moore. *Australian Institute of Metals, Journal,* v. 3, Aug. 1958, p. 124-142.

Theory of solution etching; thermal etching and vacuum evaporation; cathodic ion bombardment; new etchants for metallography; crystal faces revealed by etchants. 138 ref. (M20q)

561-M. **Interior Metallography.** N. A. McKinnon and H. L. Wain. *Australian Institute of Metals, Journal,* v. 3, Aug. 1958, p. 157-168.

Conditions necessary for the detection of dislocations in the interior of ionic crystals, semiconductors and metals. 37 ref. (M26b)

562-M.* **X-Ray Metallography.** J. H. Auld and R. A. Coyle. *Australian Institute of Metals, Journal,* v. 3, Aug. 1958, p. 169-182.

X-ray metallography can be based on absorption, emission or diffraction of X-rays by the specimen. The first two methods provide information on the size, shape and distribution of components of a heterogeneous system, while diffraction methods also give lattice relationships in both homogeneous and heterogeneous systems. 28 ref.
(M21f, M22g)

563-M.* **Plutonium.** *Nucleonics,* v. 16, Aug. 1958, p. 96-100.

Study of Pu alloys suitable for fuel elements. Phase diagrams of Pu with U, Ni, Al, Fe, Bi, Th, Pb. Various intermetallic compounds described.
(M24b, T11g, 17-57; Pu, Al, Bi, Fe, Pb, Ni, Th, U)

564-M. **Constitution of Uranium and Thorium Alloys.** Frank A. Rough and Arthur A. Bauer. Battelle Memorial Institute, June 2, 1958. *U. S. Atomic Energy Commission, BMI-1300,* 138 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $2.75.

Systems arranged in alphabetical order. Major sections include both binary and ternary systems. Constitutional diagrams are given wherever available. 100 ref. (M24; U, Th)

565-M.* (French.) **Electronic Structure of Transition Metals and Alloys and Heavy Metals.** J. Friedel. *Journal de Physique et le Radium,* v. 19, June 1958, p. 573-581.

Electronic structure of transition metals (Fe, Co, Ni, Pd, Pt, etc.) dissolved as impurities in other metals (Cu, Al, etc.) is now fairly well understood. This knowledge permits approach to problems arising in connection with concentrated alloys and pure transition metals, as well as for rare earths and heavy metals. 16 ref. (M25)

566-M.* (Italian.) **Chromium-Vanadium-Oxygen and the Aluminum-Vanadium-Oxygen Systems.** Aurelio Burdese. *Annali di Chimica,* v. 48, June-July 1958, p. 510-516.

Study of reciprocal relationships of coexistence at various temperatures of phases which appear in these systems. Behavior of systems is almost identical. In addition to oxides of V, Cr and Al, the following ternary phases are found: $CrVO_4$, $AlVO_4$, and a complete series of solid solutions $(Cr, V)_2O_3$. On the other hand, sesquioxides of V and alumina show partial solubility in solid state. In VO_2-Cr_2O_3-V_2O_3 zone of the Cr-V-O system the end of crystallization takes place at 640° C., corresponding to ternary eutectic V_2O_5-V_6O_{13}-$CrVO_4$. Corresponding ternary eutectic of the Al-V-O system melts at 620° C. 6 ref.
(M24c, P12; Cr, V, O)

567-M. **Preparation of Powder Specimens From Active and Toxic Metals for Use in Conventional X-Ray Diffraction Studies.** A. Moore, D. B. Wright and A. J. Martin. *Journal of Scientific Instruments,* v. 35, Aug. 1958, p. 301-303.

(M20, M22g, A7)

568-M. **Diagram of Cu-Si-Zn Alloy. Pt. 2.** Genjiro Mima and Masaharu Hasegawa. *Osaka University, Technology Reports,* v. 7, Oct. 1957, p. 385-397.

(M24c; Cu, Si, Zn)

569-M.* **Surface Finish—Metallurgical and Mechanical Aspects.** K. G. Lewis. *Metal Treatment and Drop Forging,* v. 25, Sept. 1958, p. 377-384.

Various expressions used in the study of surface finish, together with the more important machine and material variables which affect them. Chip formation and its influence on surface finish. Effect of metallographic structure on the formation of built-up edge. Investigations into the mechanism underlying the formation of "smear metal", and the various means for its removal. Examination of the effect of cold working on surface finish. (Concluded.) 57 ref.
(M27, S15, G17)

570-M.* (German.) **Formation of Goss Structure in Iron-Silicon Alloys.** K. Detert. *Metall,* v. 12, Sept. 1958, p. 817-821.

Goss-structure sheet metal is important in the manufacture of transformers because of its magnetic properties. Alloys with 3% Si, 0.1% Mn, and sometimes 0.1% Ni, 0.1% Cu, first hot rolled to 3.4 mm. then cold rolled in several steps with intermediate annealing at about 800° C., were structure tested. Goss-structure favored by cold working is thought to be influenced by still unknown trace elements. 21 ref.
(M27g, M26c, P16; SGA-n, Fe-b, *Si*)

571-M.* (German.) **"Stacking Faults" in Cold Deformed Metals With Face-Centered Cubic Lattices.** Ch. Wagner. *Metall,* v. 12, Sept. 1958, p. 824-829.

Lattice faults as a consequence of cold deformation detectable by X-ray interference lines. Polycrystalline materials tested by diffractometer and photographic methods. Increase in strength and rigidity after cold working thought to be a consequence of "stacking faults" in the lattice structure. 27 ref.
(M26s, 3-68)

572-M.* (Japanese.) **Atomic Power and Metals; Radiation Damage.** E. Fujita. *Metals,* v. 28, Sept. 1958, p. 673-676.

Damage is caused by an atomic collision of neutron and an atom in a lattice point. A neutron of the order of MeV in a pile can damage severely, but thermal neutron can not. The particles which can do the damage are fast neutrons, fast protons and deuterons, fast alpha-particles, fast electrons, hard X-rays, nuclear fission products and accelerated ions, which should have energy of the order of MeV. Radiation damage consists of atomic displacement in lattice, formation of Frenkel lattice imperfection, formation of impurity and thermal spike and displacement spike (or recoil).
(M26, P18, 2-67)

573-M. **Investigation of Thermodynamics and Composition of Wustite.** H. Engel. *Archiv für das Eisenhüttenwesen,* v. 28, no. 2, Feb. 1957, p. 109-115. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB34.)

(M26; Fe)

574-M. **New Electrolytic Reactions for Stainless Steels Containing the Sigma Phase.** I. Bertetti. *Metallurgia Italiana,* no. 7, 1956, p. 324-326. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GE85.)

Previously abstracted from original. See item 363-M, 1956.
(M21, M27; SS)

575-M. (Russian.) **Measurement of Local Characteristics of Alloys by Radioactive Isotopes.** S. Z. Bokshtein. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 974-978.

Methods study local structure and changes in metal microstructures, including use of electron microscope, X-ray analysis, microspectral method and autoradiography with particular emphasis on the latter. 35 ref. (M21, M22, M23, 1-59)

576-M. **Some Data on the Phase Diagram of the Chromium-Columbium System.** V. P. Elyutin and V. F. Funke. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 3, Mar. 1956, p. 68-76. (Henry Brutcher, Altadena, Calif., Translation no. 4304.)

Experimental preparation of specimens; determination of melting points; liquidus temperatures; three portions of the solidus. Phase composition and structure of alloys; results of micrographic analysis and microhardness measurements. Identification and composition of intermetallic compounds; eutectic transformations and points; boundaries of single-phase solid solutions; data on intersolubility of Cr and Cb. Approximate phase diagram (liquidus and solidus) of Cr-Cb system.
(M24b; Cr, Cb)

577-M. (Chinese.) **Basic Factors Influencing the Original Structure of Hadfield Steel.** Chzhai Khun-cyun. *Tszise chzhitsao,* v. 5, no. 3, 1956, p. 5-9.

Grain size in Hadfield steel influences its ductility, impact resistance, wear retsistance and other properties. Grain size depends on Al content, bath temperature, hardening velocity, carbon content, gas content in liquid steel. Introduction of 0.1% Al, lowering the teeming temperature to 1300-1320° C., is recommended. (M27c, Q-general, D9r; AY, *Al,* AD-p35)

578-M.* (French.) **Influence of the Composition of Reagents, With or**

Without Traces of Copper, on Micrographic Etching of Refined Aluminum. Gerard Wyon. *Comptes Rendus,* v. 247, July 28, 1958, p. 458-461.

Fluorated aqua regia solutions can, according to their composition, produce two types of etch patterns, either large geometric figures or very numerous microfigures. Addition of a few parts per million of Cu ions transforms a microfigure etchant into an etchant that produces geometric figures, but only when applied to Al of commercial purity. 8 ref. (M20q; Al)

579-M. (Russian.) **Electron Microscopy of 1Kh18N9T Steel After Various Forms of Heat Treatment.** E. I. Kvashina. *Metallovedenie i Obrabotka Metallov,* no. 5, 1957, p. 35-38.

Influence of hardening temperature and aging temperature and duration on microstructure of steel containing 0.11% C, 1.20% Mn, 0.42% Si, 17.9% Cr, 10.06% Ni, 0.50% Ti, 0.21% S and 0.02% P. When hardening temperature is raised from 1100 to 1300° C. the quantity of Ti carbides is reduced. When hardened at 1050-950° C., an acicular phase appears alongside the Ti carbides. The nature of the acicular phase has not been established. The sharp increase in impact strength when hardened at a temperature above 1050° C. is linked with the diffusion of this phase. (M27, 2-64; SS)

580-M.* **Structure Determined Properties of Evaporated Bismuth Films.** Carl E. Drumheller. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 27-33.

Infrared electrical and electron microscope studies on Bi films obtained by condensation on cellulose nitrate substrate. Films possessed single-layer polycrystalline structure; thickness resistance measurements and low-frequency current noise studies indicated that major contribution to film resistance was from grain boundaries. Grain boundaries fell into two distinct categories according to whether they divide crystallites with similar or unrelated orientations. (M26, M27; Bi, 14-68)

581-M.* (Japanese.) **Anomalous Characteristics of Finished Metal Surfaces.** M. Matsunaga. *Metals,* v. 28, Oct. 1958, p. 721-725.

Depending on the finishing method, metal surfaces have completely different characteristics from the interior. Methods of measurement are: (1) optical (microscope, polarization, reflection); (2) diffraction (X-ray); (3) electric (surface potential. resistance); (4) microhardness testing; (5) surface property (fluid resistance, friction); (6) chemical (corrosion); (7) electrochemical (electrode potential, electrolytic deposit). Anomalies are caused by smut and smear, adsorption, chemical changes, mechanical strain and lattice imperfections. (M27, M21, M22, S14)

582-M. **Modern Techniques in Electron Metallography.** R. I. Garrod and J. F. Nankivell. *Australian Institute of Metals, Journal,* v. 3, Aug. 1958. p. 183-202.

Preparation and use of replicas; advantages and limitations of reflection, emission and scanning microscopy. Methods recently developed for direct examination of thin foils. Techniques complementary to electron microscopy, such as electron microdiffraction and electron probe analysis. 123 ref. (M21e)

583-M. **Crystal Structure of Ni_3B and Co_3B.** Stig Rundqvist. *Acta Chemica Scandinavica,* v. 12, no. 4, 1958, p. 658-662.

Ni_3B and Co_3B are isostructural with cementite (FeC). A single-crystal structure determination of NiB has been made. Some properties of the cementite structure. 24 ref. (M26q, M21f; Co, Ni, *B*, 14-68)

584-M. (English.) **Metallic Alloys.** J. Friedel. *Nuovo Cimento, Supplemento,* v. 7, no. 2, 1958, p. 287-311.

Study of energy states, behavior of electrons and nuclei, effect of impurities for metallic alloys in general. 40 ref. (M25, M26p, 3-69)

585-M. **Composition Versus Hot Strength Diagrams of Alloys of the Titanium - Vanadium - Columbium System.** V. S. Vlasov and I. I. Kornilov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 7, July 1958, p. 136-139. (Henry Brutcher, Altadena, Calif., Translation no. 4346.)

Study of hot strength of Ti-rich alloys in Ti-V-Cb system. Phases present. Preparation of alloys along three radial sections from Ti corner with V/Cb ratios of 3/1, 1/1 and 1/3, respectively. (M24c, 2-61; Ti, V, Cb)

586-M. **Hexagonal Ordered Phases in the System Titanium-Aluminum and Titanium-Indium.** K. Anderko. *Zeitschrift für Metallkunde,* v. 48, no. 2, 1957, p. 57-58. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. NRC-C2474.)

Previously abstracted from original. See item 169-M, 1957. (M24; Ti, Ag, In)

587-M. **Cohesive Energy of Potassium.** Sam Berman, Joseph Callaway and Roger D. Woods. Miami University, Dept. of Physics. *U. S. Office of Technical Services,* PB 124594, Nov. 1955, 8 p. (Available at Library of Congress, Washington, D. C.—Microfilm $1.80; Photostats $1.80.) (M25; K)

588-M. **Investigation on the Zone Theory of the Energy of Electrons in Metals.** George B. Spence and Ernst Katz. Michigan University, Engineering Research Institute. *U. S. Office of Technical Services,* PB 125898, Aug. 1956, 122 p. (Available at Library of Congress, Washington, D. C.—Microfilm $6.30; Photostats $19.80.)

Theoretical investigation of certain general problems which occur in using the zone theory of the electron energy bands to determine the phase boundaries of those alloys agreeing with the Hume-Rothery electron concentration rules. (M25)

589-M. **Cohesive Energy of Noble Metals.** K. Kambe. Harvard University. *U. S. Office of Technical Services,* PB 126153, Apr. 1955, 12 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.40; Photostats $3.30.)

Cohesive energies calculated at the observed lattice spacings with the rigid ion-core assumption are 61.7 for Cu, 55.8 for Ag and 49.2 for Au in comparison with the experimental values of 81.2, 68.0 and 92.0 respectively. (M25; Cu, Ag, Au)

590-M. **Problems Encountered in a Study of the Beryllium-Chromium System.** George H. Schippereit. Polytechnic Institute of Brooklyn. *U. S. Office of Technical Services,* PB 127951, May 1948, 5 p. (Available at Library of Congress, Washington, D. C.—Microfilm $1.80; Photostats $1.80.) (M24b; Be, Cr)

591-M. **Crystallographic Structure and Orientation of the Y' Phase in Four Commercial Nickel-Base Alloys.** J. A. Amy and W. C. Bigelow. Michigan University. *U. S. Office of Technical Services,* PB 131518, July 1957, 18 p. $.50.

Selected area electron diffraction patterns obtained from matrix precipitate particles isolated by the extraction-replica technique from aged specimens of four commercial Ni-base alloys, Inconel-X, Waspalloy, M-252 and Udimet, which contain Ti and Al as hardening agents. From these patterns the matrix particles have been conclusively identified as the gamma phase. The ordered or super-lattice structure reported for this phase in simpler alloy systems occurs also in these complex alloys and the particles develop with a high degree of preferred crystallographic orientation relative to the matrix lattice. (M26c, M27d; Ni-b)

592-M. **Intermediate Phases in the Iron-Tungsten and Cobalt-Tungsten Binary Systems.** Edward C. Van Reuth. Air Research and Development Command. Wright Air Development Center. *U. S. Office of Technical Services,* PB 131627, Dec. 1957, 29 p. $.75.

Some 53 alloys examined in an attempt to verify the finding of sigma phases in Fe-W and Co-W alloy systems. Selected regions of both binary equilibrium diagrams were investigated metallographically and by X-ray diffraction. It was also found that some portions of the existing equilibrium diagrams should be changed. (M24b; Fe, W, Co)

593-M.* (German.) **Isolating Grain Boundaries in Steel.** Hermann Schenck. Eugen Schmidtmann and Heinz Muller. *Archiv für das Eisenhüttenwesen,* v. 29, Aug. 1958, p. 479-484.

Nature of grain boundaries in iron alloys. The influence of decarburization annealing in hydrogen-steam mixtures (3-5% H_2O) upon the microscopic behavior of chemically separated components. The isolate is also investigated after removal of the base metal through chlorination or dissolving in iodide alcohol. 10 ref. (M27f; ST)

594-M. **Possible Use of Tritium in Radiographic Study of Hydrogen Distribution in Titanium and Zirconium.** B. I. Bruk and G. I. Nikolaev. *Academy of Sciences of the USSR, Proceedings,* v. 116, no. 1-6, 1957, p. 825-828. (Translation by Consultants Bureau, Inc.)

Investigation of hydrogen distribution in Ti and Zr. forgings and welds by means of tritium autoradiography. 6 ref. (M23q; Ti, Zr, EG-n43)

595-M. **Strontium-Antimony System and the Heats of Formation of Compounds of Strontium and Antimony.** S. A. Shchukarev, M. P. Morozova and Kan Kho-in. *Journal of General Chemistry of the USSR,* v. 27, no. 7, 1957, p. 1803-1805. (Translation by Consultants Bureau, Inc.)

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

The existence of the compounds $SrSb_2$, SrSb, Sr_3Sb_2 and Sr_2Sb is established in the Sr-Sb system. Enthalpies of formation found for SrSb, Sr_3Sb_2 and Sr_2Sb. 4 ref.
(M24b, P12q; Sr, Sb)

596-M.* Polishing Hard Metals Electrochemically. J. M. Dickinson. *Metal Progress,* v. 74, Oct. 1958, p. 142-144.

A new technique simplifies metallographic preparation of high-melting metals and their alloys. By simultaneous use of mechanical and electrolytic polishing, layers of worked metal are avoided and an exceptionally smooth surface is produced in a short time.
(M20p; SGA-q)

597-M.* Better Metallographic Techniques—Polishing by Vibration. E. L. Long and R. J. Gray. *Metal Progress,* v. 74, Oct. 1958, p. 145-148.

A new technique makes it possible to polish up to 24 specimens at a time without attention by a metallographer. Surfaces are generally better than can be achieved by hand polishing. (M20p)

598-M.* Light-Figure Phenomena Revealed and Crystal Faces Developed by Chemical Etching in Copper and Alpha-Brass Crystals. Mikio Yamamoto and Jiro Watanabe. *Tohoku University, Science Reports of the Research Institutes,* v. 10, June 1958, p. 240-250.

Distinct {100}, {110} and {111} light figures were revealed in copper and alpha brass single crystals etched with 20% aqueous solution of ammonium persulphate and, in alloy crystals containing more than about 20% Zn, etched with aqua regia plus water (1:1). Crystal faces developed by etching very systematically in accordance with etching conditions and crystal composition. (M26, M20q; Cu, 14-61)

599-M.* X-Ray Study of Cold Worked Metal Single Crystals. Tomiya Sutoki and Koichi Nakajima. *Tohoku University, Science Reports of the Research Institutes,* v. 10A, no. 2, 1958, p. 77-84.

The change in reflected intensity of X-ray due to the deformation of metal single crystals of Al and Zn examined with microphotometer by using Cu-K_α radiation. In Al single crystals, a large change in the relative intensity of (111) reflections was observed with an increase of deformation, and almost saturated at a few percent elongation. The increasing rate of the relative intensity reflected from the active slip plane was larger than that from the latent slip planes. Similar results were obtained with Zn single crystals. 7 ref.
(M26, M22g; Al, Zn, 14-61)

600-M. Study of the Thorium-Uranium Alloy System. G. G. Bentle. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/706, 1958, 13 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Resistivity and lattice parameter data complete part of the Th-U phase diagram and confirm that U causes a slight decrease in phase transformation temperature of Th and that the solubility of U in Th is less than 1% at room temperature and increases to about 7% at 1270° C. 10 ref. (M24b; U, Th)

601-M. Metallographic Studies of Uranium. T. K. Bierlein and B. Mastel. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1855, 1958, 17 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Conventional metallography, precharacterized surface metallography, and fractography used to study the nature and extent of reactor-induced microstructural changes in U. Difficulties in microstructural interpretation can be surmounted by studying relative effect of such parameters as temperature of irradiation, flux intensity, burnup by supplementary metallographic techniques. 18 ref.
(M21, M23; U, 14-70)

602-M.* (German.) **Metallographic Techniques for Different Materials.** Walter Strohfeld. *Industrieblatt,* v. 58, Oct. 1958, p. 442-446.

Summary of recent techniques; suggestions for improvement of metallographic grinding, polishing and etching. Consideration of materials; soft and hard metals, precious and nonprecious; time involved for different materials and methods; manual and mechanical procedures, combinations. Improved electrolytic polishing procedure, wet polishing and diamond polishing. Etching of rare metals; traditional etching agents and new ones. 27 ref.
(M20)

603-M.* (German.) **Surface Impression Films.** H. Mahl. *Metalloberflache,* v. 12, Oct. 1958, p. 296-301.

Surface impression films obtainable by oxidation, vapor deposition, a thin varnish coat and polymerization serve mainly for electron microscope surface tests. In a film of equal thickness at any point of the profile, the surface shape is seen under the electron microscope through the effect of inclined planes. A depression gives the same picture as an elevation. By vaporizing a heavy metal at an acute angle to the surface, a more plastic picture is obtainable. (To be continued.) (M20r, M21e)

604-M.* (Japanese.) **Structural Diagram of Acicular Cast Iron Containing Molybdenum and Copper.** Tohei Ototani, Masuteru Maruyama, Youichi Tokunaga and Mitsuo Hara. *Japan Foundrymen's Society, Journal,* v. 30, Aug. 1958, p. 603-608.

Molten pig iron containing Mo and Cu was cast in a sand mold with steps 10, 20, 30 and 40 mm. in diameter. The structural diagram for acicular cast iron having a Brinell hardness of 240 to 280 was determined by metallographic observation, thermal analysis and hardness measurements. Matrix structure depended upon the cooling rate within the temperature range of austenite and the amount of alloying elements. 10 ref.
(M27, N12, Q29n, 2-60; CI, *Cu,* Mo)

605-M.* (Russian.) **Nature of Etching Figures of Aluminum-Copper (4% Cu).** N. N. Byinov and R. R. Zakharova. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 289-292.

In aging of Al-Cu (4% Cu) at 150° C. there is a connection between the hardening of the alloy and the dimensions and form of the etched figure. The etching figures, while they retain the correct form, are related to helical dislocation. Calculation was made of disorientation of mosaic blocks and the thickness of dislocation. By strengthening the alloy through aging, thickness of dislocation increases. 9 ref. (M26f, N7a; Al, *Cu*)

606-M. Stacking Faults in Close Packed Metallic Lattices. Pt. 1. The Nature and Origin of Stacking Faults. T. R. Anantharaman. *Current Science,* v. 27, July 1958, p. 238-241.
13 ref. (M26s)

607-M. Study of Metallic Carbides by Electron Diffraction. Pt. 2. Crystal Structure Analysis of Nickel Carbide. Sigemaro Nagakura. *Physical Society of Japan, Journal,* v. 13, Sept. 1958, p. 1005-1014.
13 ref. (M26r; Ni)

608-M. Studies on Surface Layer of Polished Metals by Electron Diffraction and Electrical Contact Resistance Measurements. Masahisa Matsunaga. *University of Tokyo, Institute of Industrial Science, Report,* v. 7, Mar. 1958, p. 226-252.

Studies on effects of polishing and electric resistance of surface films. 41 ref. (M26, M27, P15g, 14-62)

609-M. Structural Peculiarities of Molten Alloys in Certain Binary Systems. D. K. Belashchenko and J. V. Stalin. *Doklady Akademii Nauk SSSR,* v. 117, no. 98, 1957, p. 101. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4472.)
(M25, 14-60)

610-M. Electron Structure of Nickel and Its Alloys. G. S. Krinchik. *Fizika Metallov i Metallovedenie,* v. 4, no. 1, 1957, p. 36-40. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4030.)

Previously abstracted from original. See item 370-M, 1957.
(M25, P16; Ni)

611-M. Distribution of Alloying Elements Between Solid and Liquid Phases in Alloys. B. A. Movchan. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 4, Apr. 1958, p. 122-123. (Henry Brutcher, Altadena, Calif., Translation no. 4378.)

Microradiographic study of distribution of Ag, Cu and Zn between solid and liquid phases in binary Al alloys, segregation films at solid-liquid interface.
(M23n, N12; Al-b, *Ag, Cu,* Zn)

612-M. (German.) **Structure of the Surface Zone of Iron in the Planes (100) Treeing.** Ladislav Spacek. *Chekhoslovatskii Fizicheskii Zhurnal,* v. 8, no. 4, 1958, p. 411-415.

Dendritic structure in the surface zone detectable only within small inclination angles of the plane of observation to the plane (100). The degree of inclination depends on the size of crystals. 4 ref. (M26; Fe)

613-M. (German.) **Structure of Electrolytic Nickel Coatings of 20 to 50 Å.** H. Pfisterer, A. Politycki and E. Fuchs. *Naturwissenschaften,* v. 45, June 1958, p. 282-283.

Study of the thickness of the oxide film under the coating and its behavior in relation to the base metal based on metallographs and diffraction patterns. 6 ref.
(M26, M27, L17; Ni, 8-62)

614-M. (Russian.) **Crystal Structure of Cu and Cu Solid Solutions Influenced by Deformation.** L. N. Guseva and A. A. Babareko. *Doklady Akademii Nauk SSSR,* v. 120, no. 3, 1958, p. 518-520.

Structure changes studied on filings and rolled samples by measuring the width of X-ray interference lines. Results for electrolytic Cu, Cu + 3% Zn, Cu + 10% Zn, Cu +

4.6% Al and Cu + 13% Al. 8 ref. (M26, M22g; Cu-a, Cu-b, *Zn, Al*)

615-M. (Russian.) **Structure of Melted Bismuth-Tin Alloys.** N. V. Alekseev and Ya. I. Gerasimov. *Doklady Akademii Nauk SSSR,* v. 121, no. 3, 1958, p. 488-491.

10 ref. (M25; Bi, Sn, 14-60)

N — Transformations and Resulting Structures

559-N.* **Solid State Graphitization in Iron-Carbon-Silicon Alloys.** Ariel Taub. *Foundry,* v. 86, Oct. 1958, p. 82-83.

Graphite rosette nucleation and growth in a hypo-eutectic white cast iron. Presence of a dark etching layer that contained flake graphite was observed around the growing rosettes. The process of graphitization is pictured as occurring in two steps: the precipitation of secondary globular carbides from austenite and the decomposition of globular carbides into graphite and carbon-depleted austenite. (N8s; CI-p, *Si*)

560-N.* **Analyses for Diffusion During Plastic Deformation.** J. Simmons and J. E. Dorn. *Journal of Applied Physics,* v. 29, Sept. 1958, p. 1308-1313.

General equation for self-diffusion in deforming media. Methods of analyses for determining the self-diffusivity as a function of time for prescribed strain histories given for special cases of linear diffusion. No unrealistic assumptions relative to the constancy of the diffusivity with time are made. (N1b, Q24)

561-N.* **Phase Transition in Solid Mercury.** C. A. Swenson. *Physical Review,* v. 111, July 1, 1958, p. 82-91.

A polymorphic transition in solid mercury which was initially discovered by Bridgman has been studied at lower temperatures and pressures than those previously used. The transition would occur at zero pressure and 79° K. if these data are extrapolated. However, the transition begins to show time effects and large pressure hysteresis at much higher temperatures, and below 93° K. it can only be made to run irreversibly and in the alpha-beta direction, and then only upon the application of several thousand atm. pressure. (N6p; Hg)

562-N. (Bulgarian.) **X-Ray Study of Aging Lead-Tin Alloys.** L. N. Larikov. *Doklady Bolgarskoi Akademii Nauk,* v. 9, no. 4, 1956, p. 65-68.

Monocrystals of alloys containing 4.5, 6.0 and 19.0% Sn, were prepared by Czochralski's method, tempered after homogenizing from 182°, and aged at room temperature. A conversion of the monocrystal in the aging process into a polycrystalline aggregate was detected, and the effect of the composition of the alloy on the time of aging was established. Changes of lattice spacing of the solid solution in the aging process investigated by means of a special precision focusing camera. (N7; Pb, Sn)

563-N. (Czech.) **Structural Changes in Low-Carbon Low-Alloy Steels on Tempering.** Foldyna Voznyak. *Hutnické Listy;,* no. 11, 1956, p. 663-669.

Electron diffraction diagrams were taken from two steels with 0.08% C and 1.24% V (at an atomic ratio V:C of 3.62) and with 0.11% C and 2.25% Mo (with an atomic ratio Mo:C of 2.56) in the course of a 2-hr. anneal in the range 200-700° C. Specimens were first austenitized for 15 min. at 1250° C. and quenched into 10% NaOH. The precipitation of crystallographically developing special carbides (V_4C_3 and Mo_2C) causes the secondary hardness on annealing at temperatures of 450-600° C. (N8a, J29; AY)

564-N.* (French.) **Study of the Nucleation of Graphite and the Kinetics of Graphitization of Prehardened White Cast Irons. Pt. 1.** Pierre Laurent and Michel Ferry. *Fonderie,* June 1958, p. 249-262.

Influence of number of nodules of graphite in starting material on speed of graphitization during isothermal and two-stage malleabilizing; influence of a tempering operation prior to malleabilizing treatment on nucleation of graphite and speed of graphitization. (N2, N8s, J23b; CI-p)

565-N. (Polish.) **Effect of Vibrations, Transformation of Retained Austenite to Martensite.** E. Smihorski. *Prace Instytutaw Ministerstwa,* v. 6, no. 19, 1957, p. 30-33.

Effect of mechanical ultrasonic and magnetostrictive vibrations on the microstructure of quenched steel containing 1.48% C, 0.70% Mn, 0.35% Si and 1.30% Cr. A particularly marked effect on the change of microstructure was shown by vibrations connected with magnetostriction, the effectiveness of which was greater than that of tempering at 210° C. Magnetostrictive vibrations bring about a reduction in the amount of retained austenite, the transformation of tetragonal martensite to cubic, and breakdown of the martensite needles. (N8p, 1-74; AY)

566-N. (Rumanian.) **Cooling Curves of Cast Iron With Spheroidal Graphite.** L. Sofroni. *Studii si Cercetari Metalurgie,* v. 1, no. 2, 1956, p. 241-259.

Character of the cooling curves of gray cast iron with 3.27% C, 2.96% Si and 0.193% P, and of cast irons with spheroidal graphite with 3.20 and 3.35% C, 3.15 and 2.65% Si, 0.221 and 0.060% P and 0.074 and 0.94% Mg. Eutectic conversion in the spheroidal graphite cast iron takes place with greater supercooling and in a smaller interval of time than in gray cast iron. Increase of the Mg and P content causes an increase in the degree of supercooling on eutectic conversion but C and Si decrease it and increase the duration of eutectic conversion, because they accentuate the extent of graphitization in the process of hardening. (N8s; CI-n, CI-r)

567-N. (Russian.) **Crystal Structure of the Metastable Phase Forming on Tempering Cu-Sn Alloys With 24-27% Sn.** Yu. A. Bagaryatskii. *Kristallografiya,* v. 2, no. 2, 1957, p. 283-286.

Taking into account the structural factor and the repeatability factor, relative line densities were calculated for the phase in Cu-Sn alloys with structure similar to the hexagonal zeta phase in Ag-Zn alloys, and a comparison made with the experimental findings of X-ray structural analysis. It is shown that the tempering phase (zeta-phase) in Cu-Sn alloys is isomorphous with the zeta-phase of Ag-Zn alloys. The law for the lattice transition beta→zeta is similar to that for the transition beta→omega in Ti alloys. (N6p, J29; Cu-b, *Sn*)

568-N. (Russian.) **Hardening of Austenite During Reverse Martensite Transformation.** V. N. Gridnev, V. T. Cherepin and N. F. Chernenko. *Metallovedenie i Obrabotka Metallov,* no. 5, 1957, p. 7-12.

An Fe-Ni-Mn alloy with 21.5% Ni, 2.86% Mn and 0.02% C, having an Ms temperature at about 10° and temperature of 470° C. for the beginning of the reverse martensite transformation, was studied to determine transformations at high rates of heating. Elongation, hardness, temperature, drop in voltage and current strength were measured. Heating was carried out at rates of 100-10,000° per sec. and the cyclic method of treatment was also used; soaking at −75° for 30 min., heating at 800° at a rate of 3000° per sec., and cooling in water. The magnitude of the volume effect during the reverse martensite transformation was the criterion of the stabilization of austenite. (N8p; AY)

569-N. (Russian.) **Some Rules for Direct and Reversed Martensitic Transformations.** E. L. Vinogradskaya and G. A. Kreslina. *Metallovedenie i Obrabotka Metallov,* no. 5, 1957, p. 12-15.

Conversions in an Fe alloy with 0.06% C, 13.2% Mn, 0.28% Cu, 2.12% Co were studied by a magnetometric method on a special apparatus. The amount of alpha-phase was determined. Temperature at the beginning of the formation of martensite was 110-113° C. Heating from −194° at a rate of 3° per min. to 680°, soaking 5 min., cooling at a rate of 3° per min. to −194°, heating to room temperature, etc., showed that the alpha-gamma transition occurs at 350-650° and that in the second cooling about half as much martensite is formed in comparison with the first heating. The greatest stabilization of the gamma-phase is observed on heating after the first cycle up to 630°. (N8p; AY)

570-N. (Russian.) **Strain Hardening, Recrystallization and Softening of Alloyed Austenite.** L. A. Metashop and M. E. Blanter. *Metallovedenie i Obrabotka Metallov,* no. 5, 1957, p. 15-23.

Deformed specimens of an alloy steel with 1.0 to 1.2% C, 12% Mn, and additions of 0.98, 3.08 and 5.07% Cr were annealed at temperatures from ambient up to 1100° C., at intervals of 50-100° C. The processes of softening and recrystallization were assessed by measuring hardness and electrical resistance, as well as by metallographic examination and X-ray structural analyses. Softening of the austenite commences with a recovery process, and is completed at a low deformation degree (5%) only at the expense of the recovery process. Previous plastic deformation sharply lowers the temperature of the beginning of both the softening and recrystallization, and affects only slightly the end temperature of the softening process. (N5, N7, 3-68; AY)

571-N. (Russian.) **Problem of the Nature of Martensitic Transformation.** M. E. Blanter and P. V. Novichkov. *Metallovedenie i Obrabotka Metallov,* no. 6, 1957, p. 11-14.

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

Changes in the condition of the retained austenite during martensitic transformation and the effect of these changes on its stability against forming further martensite particles. Specimens of steel with 1.21, 1.18 and 1.52% C and 2.04, 2.98 and 2.94% Mn respectively were heated to 860° C., cooled in oil and then, after various times, in the vapors from liquid O_2. The retained austenite content was determined on an anisometer. To obtain the characteristics of phase-work-hardening, a statistical method was used to measure the microhardness of the retained austenite. (N8p; AY, *Mn*)

572-N. (Russian.) **Effect of Vanadium on the Gamma→Alpha Transformation in Iron-Cobalt-Vanadium Alloys.** T. V. Krasnopevpeva and V. G. Livshits. *Sbornik Trudov (Tsentralny Nauchno-Issledovatelskii Institut Chernoj Metallurgii. Institut Stali)*, no. 15, 1956, p. 68-85.

Investigation of transformation during continuous cooling of gamma-phase and also during isothermal holding on alloys with 0, 2, 4, 5, 8, 10 and 12% V, at a constant Co content of 51%. Coercive force measured and microstructure alloys examined. As the V content was increased from 0 to 12%, the temperature corresponding to the start of gamma → alpha transformation changed from 925 to 525° C. (N6, 2-60; Fe, Co, *V*)

573-N. (Russian.) **A Study of Transformation During Deformation of Iron - Cobalt - Vanadium . Permanent Magnet Alloys.** G. V. Pshechenkova. *Sbornik Trudov (Tsentralny Nauchno-Issledovatelskii Institut Chernoj Metallurgii. Institut Stali)*, no. 15, 1956, p. 111-123.

Transformation processes leading to high magnetic properties in alloys containing 5-18% V and 50-52% Co. Changes in saturation magnetization measured with an Akulov anisometer; electrical resistivity, hardness, microhardness and microstructural examination; dilatometric and in some cases X-ray analyses. A section of the equilibrium diagram was constructed for alloys with 50% Co and 8-13% V. Alloys containing less than 12% V have a gamma-phase structure and do not undergo much change on heating and cooling. (N6p, P16; Fe, Co, V, SGA-n)

574-N. (Russian.) **Problem of the Gamma-Phase Stability in N29K Alloy at Subzero Temperatures.** M. I. Yudkevich and N. A. Solov'eva. *Sbornik Trudov (Tsentralny Nauchno-Issledovatelskii Institut Chernoj Metallurgii, Institut Stali)*, no. 15, 1955, p. 124-130.

Study of factors by which the gamma-alpha transformation can be brought down below −70° C. Specimens containing 26-32% Ni, 13-19% Co, 0.5-0.8% Cr and remainder Fe, were examined for the effect of alloy composition, cold work and heat treatment on the stability of gamma phase at temperatures below 0° C. Specific resistivity and coercive force were measured after annealing 1 hr. at 950° C. and after annealing and cooling for 2 hr. at −80° C. (N6p, 2-63; Ni, Fe)

575-N. (Russian.) **Recrystallization on Heating Eutectoid Aluminum Bronze.** G. N. Bogacheva and V. D. Sadovskii. *Trudnovoi Institut Fizicheskoi Metallurgii Ural Filial Akademii Nauk SSSR*, Series 17, 1956, p. 125-138.

Structural mechanism of recrystallization on heating specimens of Al bronze with 12.11% Al. The kinetics of the beta' beta-transformation on heating were examined dilatometrically on fully quenched samples. A comparatively rapid heating (200-300° C. per min.) does not lead to recrystallization, the grain showing great stability. The phase transformation which starts, according to dilatometric curves, at 420° C., proceeds in the interior of the grains; this process of recrystallization is not accompanied by recrystallization of the solid beta-solution as involved by internal strain hardening on reverse transformation to "martensite". (N5; Cu-s, *Al*)

576-N. (Russian.) **Dilatometric and X-Ray Structural Analysis of Steels.** E. S. Tovpenets and G. N. Sin'kovskaya. *Trudy Donetskogo Industrialnogo Instituta*, v. 19, 1957, p. 59-64.

Effect of chemical composition, system of cooling and homogeneity of the steel on the decomposition of supercooled austenite in alloy construction steels containing C 0.32-0.42, Mn 0.40-0.72, Si 0.25-0.38, P 0.035, S 0.030-0.040, Cr 0.70-2.44, NiO 3.82, Mo 0-0.43, V 0-0.17 studied by dilatometric and X-ray structural analysis. The higher the alloy content, the lower is the temperature of beginning and end of decomposition of supercooled austenite. When degree of homogeneity of the steel decreases, the temperature of the end of decomposition of supercooled austenite is lowered to the region of lower temperatures. (N8; AY)

577-N. (Russian.) **Study of the Solubility of Carbides in Gamma Iron by Measuring the Width of the Diffraction Lines.** M. D. Perkas and A. E. Shamov. *Trudy Kuibeyshevskogo Inshener-Stroitelnogo Instituta*, Series 4, 1957, p. 177-183.

Investigations on low-carbon steel with 0.1% C, alloy steels with 6 to 11% Cr, 0.5% Ti, or 1.16% Cb, and on complex alloy steels with either 0.67% Ti and 5.7% Ni or 1.45% Cr and 0.83% V, or with 1.48% Mn and 1.4% V. To dissolve the carbides in the gamma phase, specimens were heated to 850-1300° C. and then quenched into a 10% aqueous solution of sodium hydroxide. X-ray diagrams were made in a back reflection camera with Cr-radiation. Relation between width of the diffraction lines and quenching temperature was obtained. (N8r, M22g; CN, AY)

578-N. (Russian.) **Low-Temperature Transformations in Austenitic Steels Used for Instrument Making.** F. A. Bogachev. *Trudy Leningradskogo Instituta Aviats ionnogo Priborostroeniya*, no. 22, 1957, p. 3-22.

Thermomagnetic and metallographic analysis used to study the effect of hot and cold plastic deformation, partial surface decarburization and isothermal holding at room temperature on martensitic transformation in thermomagnetic alloys (C 0.05-0.15%, Ni 30.8-37.0%, Mn 0.2-2.4%, Cr 10-12%), alloys with special thermal properties (C 0.05-0.30%, Ni 20.0-34%, Cr 2.3-2.8%, Co 5.7%) and thermo-bimetals (C to 0.36%, Ni 22.0-37.0%, Cr 2.0-3.0%). (N8p; AY, SGA-n, SGA-s, SGA-a)

579-N. (Russian.) **Investigation Into Diffusion of Sulphur in Nickel.** A. A. Presnyakov and L. M. Novikova. *Tsvetnye Metally*, no. 2, 1957, p. 73-76.

Ni was saturated with sulphur by heating specimens in different states (cast, deformed, etc.) to 400, 500, 600, 650, 700, 800 and 850° C. in a closed cast iron box, in which was placed 10 g. of S. Thickness of the layer of Ni affected by the S was determined by microanalysis. Diffusion of S is first noticeable at 500° C., the diffusion rate falling with increasing degree of preliminary deformation. (N1, 2-61; Ni, *S*)

580-N. The Self-Diffusion of Niobium. Pt. 2. R. Resnick, L. S. Castelman and L. Seigle. Sylvania Electric Products Inc. *U. S. Atomic Energy Commission, SEP-248*, June 30, 1958, 12 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) **$.50.**

Self-diffusion coefficient is measured as a function of temperature. Procedures have been developed for the preparation of $CbCl_5$ from a solution of radioactive Cb_{95} in oxalic acid, and the subsequent vapor plating of a radioactive metallic layer from this volatile compound. Values for the self-diffusion coefficient at 2000 and 1800° C. (N1d; Cb)

581-N. Survey of Ternary and Quaternary Metastable Gamma-Phase Uranium Alloys. Victor W. Storhok, Arthur A. Bauer and Ronald F. Dickerson. Battelle Memorial Institute. *U. S. Atomic Energy Commission, BMI-1278*, July 15, 1958, 36 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) **$1.25.**

Review of the effects of ternary and quaternary alloying on the stability and properties of U-Zr, U-Cb and U-Mo gamma-phase alloys. Effects of ternary and quaternary additions of Cr, Mo, Cb, Ru, V and Zr, on transformation kinetics, transformation temperature, hot hardness and corrosion resistance. 4 ref. (M24, 2-60; U-b)

582-N.* (German.) **On the Practical Application of TTT-Diagrams for Continuous Cooling of Heat Treated Steels.** Hans Bühler and Franz Josef Schmidt. *Stahl und Eisen*, v. 78, May 15, 1958, p. 663-668.

Forged specimens of 400-mm. diameter from steel 38 $MnSi_4$ and steel of about 0.5% C and 0.25% Mo studied regarding their cooling behavior from austenite point in water and oil. Precalculation of diagrams according to T. F. Russel and H. Bachmann permits a sufficiently accurate means of determining cooling characteristics for pieces up to 500 mm. diameter. 12 ref. (N8g; ST)

583-N. Distribution of Small Quantities of Carbon in Alloyed Iron. A. S. Zavyalov and B. I. Bruk. *Academy of Sciences of the USSR, Proceedings*, v. 115, 1957, p. 667-670. (Translation by Consultants Bureau, Inc.)

Nature of distribution of carbon in alloyed iron studied by autoradiography using C^{14}. 8 ref. (N1e, 1-59; Fe)

584-N.* (Russian.) **Rhenium Recrystallization Diagram.** E. M. Savitskii, M. A. Tylkina and K. B. Povarova. *Doklady Akademii Nauk SSSR*, v. 119, Mar. 11, 1958, p. 274-277.

Recrystallization temperature for cast Re is lower than for the metallo-ceramic Re. Re does not have tendencies to sudden grain growth even at annealing temperatures as high as 2000 to 2500°. Grain diameters deformed by various degrees of compression higher than critical do not exceed 15 to 20 microns for metallo-ceramic Re and 100 microns for cast. High hardening property of Re calls for fre-

quent intermediate annealing during cold treatment.
(N5, 2-64, M27c; Re)

585-N. (Russian.) **Recrystallization Texture in Low-Carbon Steel After Cold Rolling.** K. V. Grigorov and G. P. Blokhin. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 331-338.

Magnetometric study. As the degree of deformation is increased, there are changes in both the type of recrystallization texture and the degree of its perfection. For 90-95% deformation the first type of recrystallization texture, (001) [100] and (110) [001] is strongly developed. A second type of recrystallization texture is also present and becomes predominant on further increase of the degree of deformation. (N5, M26c; CN-g)

586-N. (Russian.) **Effect of Intermediate Annealing on Cold Rolling Texture and Recrystallization.** K. V. Grigorov and G. P. Blokhin. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 339-343.

Magnetometric study of effect of intermediate annealing at 800-1000° C. on the cold rolling texture and recrystallization of low-carbon and transformer steels. On cold rolling to high degrees of total deformation, with intermediate annealing, the texture formed is that characteristic of cold rolling to small degrees of deformation, without intermediate annealing. This indicates that it is possible to control the formation of cold rolling and recrystallization texture by selecting the number of intermediate anneals and degrees of deformation.
(N5, M26c, 2-64; ST)

587-N.* **Transformation Kinetics of Beta Plutonium.** R. D. Nelson. *American Society for Metals, Transactions,* v. 51, Preprint no. 107, 1958, 6 p.

Transformation kinetics determined by a fluid displacement technique. Rate of formation of the alpha phase from the beta phase was determined after beta heat treating and allowing the sample to transform isothermally in the alpha range. Isothermal reaction curves were obtained from −78 to +90° C. A time-temperature-transformation curve showed the maximum rate of transformation to be approximately −20° C. A relationship between the fraction untransformed beta and the transformation temperature was established. 3 ref. (N6p, N7c; Pu)

588-N.* **Recrystallization, Structure, and Hardness of Low Carbon Steels Containing up to 1% Copper.** R. L. Rickett and W. C. Leslie. *American Society for Metals, Transactions,* v. 51, Preprint no. 108, 1958, 24 p.

Electron microscope and X-ray diffraction techniques were utilized in assessing effects of holding at 1100, 1200 and 1300° F. and Cu content on precipitation, hardness and lattice parameters of normalized Cu steels. Influence of recrystallization temperature, Cu content, cold reduction and heat treatment prior to or following cold reduction on recrystallization rate, grain structure and hardness. Cu greatly retarded recrystallization and, in general, increased its hardness after annealing. Under proper conditions, comparatively coarse elongated ferrite grains were obtained in cold worked and annealed steels containing 0.4% or more Cu in which case the hardening effect of Cu was minimized. 6 ref. (N5, Q29n, 1-60; CN-g, *Cu*)

589-N.* **Solid State Diffusion and the Motion of Phase Boundaries.** David D. Van Horn. *American Society for Metals, Transactions,* v. 51, Preprint no. 116, 1958, 14 p.

Using the parabolic law for diffusion penetration versus time, the equations relating the motion of a phase boundary to the diffusion rates in a simple two-phase binary system are obtained. Nomographic methods for solving these equations are presented, and the behavior of various physical systems are analyzed. In cases where the parabolic law does not hold, the capabilities and limitations of various methods of analyzing the data are discussed. The influence of time dependent boundary conditions on the motion of phase boundaries is noted. Criteria for the design of experiments are given so that deviations from ideal behavior will be recognizable and the maximum physical significance may be obtained from the data. 19 ref. (N1b)

590-N.* (Russian.) **Changes in Some Properties of Steel No. EI612 and Its Dependence on the Degree of Austenite Decomposition.** V. I. Prosvirin and L. F. Chernov. *Metallovedenie i Obrabotka Metallov,* June, 1958, p. 10-14. (Henry Brutcher, Altadena, Calif., Translation no. 4246.)

This Cr-Ni steel containing W, Ti and Al was heat treated at different temperatures for various time intervals. Brittleness was produced at all temperatures after the first 1-2 hr. Intensive lowering of shock resistance resulting from heating at comparatively high temperatures is raised by longer treatment at 750° C. $Ni_3(AlTi)$ and TiC appear as secondary phases. The lower the temperature of austenite decomposition the more noticeable the changes in properties.
(N8, Q-general, 2-64; SS)

591-N.* (Russian.) **Sigma Phase in Austenitic Steel EI448.** E. I. Uryupina and A. F. Likina. *Metallovedenie i Obrabotka Metallov,* June, 1958, p. 37-41. (Henry Brutcher, Altadena, Calif., Translation no. 4252.)

Sigma phase can be detected by chemical analysis of electrolytic deposition of steel. Determination of Fe content yields data on the quantity of sigma phase in its structure. Sigma phase develops after 100-500 hr. aging at 800°. Development of sigma phase proceeds directly from austenite. The presence of sigma phase in steel does not lower time in testing for durability.
(N8; SS)

592-N. **Metallography. Existence of a Plastic Deformation of Iron During the Alpha-Beta Transformation.** P. M. Lehr. *Comptes Rendus,* v. 244, no. 1, Jan. 2, 1957, p. 77-80. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1488.)

Previously abstracted from original. See item 128-N, 1957.
(N6p, Q24; Fe)

593-N. **Diffusion of Hydrogen Through Iron and Binary Iron-Chromium and Iron-Nickel Alloys at High Pressures and Temperatures** A. A. Scherbakova. *Zhurnal Prikladnoi Khimii,* June 1956, p. 955-960. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

(N1e; Fe, Cr, Ni)

594-N. (Russian.) **Measurement of Diffusion Rates in Metals and Alloys.** A. Ya. Shinyaev. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 979-983.

Use of electrolytic polishing to determine diffusion coefficient in alloys having many components and phase states. Following electrolytic polishing the electrolyte is studied to determine concentration of radioactive atoms in the removed layers. 5 ref. (N1a, M20p)

595-N.* **Hydrogen Behaviour of Sheet Steel.** Gordon P. K. Chu. *Sheet Metal Industries,* v. 35, Aug. 1958, p. 585-588, 619.

An understanding of the chipping of glass on mild sheet steel, due to the precipitation of hydrogen, will lead to control of processes and products and avoiding troubles which have often been traced to hydrogen. Sources of hydrogen and mechanism of hydrogen absorption, diffusion and evolution. Chipping of coatings on mild steel is reduced by using Ni or Cr alloys or coatings which slow down the rate of diffusion of hydrogen. 10 ref.
(N1, Q26s; ST, *H*)

596-N. (Russian.) **Investigation of Iron-Cobalt Alloys With High Magnetic Saturation.** G. V. Pshechenkova and T. V. Krasnopevtseva. *Sbornik Trudov (Tsentralny Nauchno-Issledovatelskii Institut Chernoj Metallurgii Institut Stali),* v. 15, 1956, p. 102-110.

Hardness, microstructure, critical points and magnetic properties of alloys containing 50% Co and 2% V. V substantially alters the critical points of alloys of the system Fe-Co, lowering the temperature of the alpha $\rightleftarrows$ gamma change. The microstructure of slowly cooled alloys exhibits a characteristic network in the grains, which is probably associated with the phenomenon of order formation. The hardness of cold rolled specimens substantialy increases on heating up to 400-600°; with further temperature increase there is a decrease in hardness which is associated with the beginning of recrystallization.
(N6p, N5, P16; Fe, Co)

597-N.* (German.) **Structure and Properties of Extruded and Cold Drawn Strip From Al-Mg-Si Type Alloys. Effect of Manganese.** W. Rosenkranz. *Aluminium,* v. 34, Sept. 1958, p. 510-518.

Influence of different amounts of Mg and Si in the presence and absence of Mn. The Mn hinders recrystallization. In the presence of Mg_2Si, a larger amount of Mn is necessary to produce this effect. If a critical degree of stress, after deformation, is passed only moderately, Mn causes crystal growth in longitudinal direction, while with a greater deformation the concentration is balanced and crystal growth proceeds in all directions. 5 ref.
(N5, N3; Al-b, 4-53)

598-N. (Ukrainian.) **Relationship Between Chemical Composition and Alpha-Phase Content.** I. M. Fishman. *Naukovi Zapiski (Zaporiz'kii Derzhovnii Pedagogichnii Institut),* v. 2, 1956, p. 79-82.

From tests on 400 casts of steel 1KH18N9T, an empirical formula was obtained by statistical analysis, giving the alpha-phase content for any actual steel composition within specification limits. Calculation was based on the multiple correlation method, assuming that Si, Cr and Ti increase the alpha-phase content, while C, Mn and Ni decrease it, to varying degrees. The formula ob-

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

tained is as follows: alpha $= -10.47$ C $+ 1.00$ Si $- 0.11$ Mn $+ 0.50$ Cr $- 0.28$ Ni $+ 1.63$ Ti $- 4.73$. The over-all correlation coefficient is 0.434, showing that results are quite trustworthy. (N8, 2-60; AY, SS)

599-N. The Kinetics of Growth of Colloidal Cobalt Particles in Mercury. F. E. Luborsky. *Journal of Physical Chemistry,* v. 62, Sept. 1958, p. 1131-1132.

8 ref. (N2, N12; Co, Hg)

600-N. On the Acceleration of the Aging Process of Aluminum-Copper Alloys Under the Influence of Small Impurities of Silver or Zinc. V. I. Arkharov and N. N. Skornyakov. *Trudy Instituta Fiziki Metallov Akademiya Nauk SSSR, Uralskii Filial,* no. 16, 1955, p. 91-96. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4335.)

(N7, 3-69; Al, Cu, *Ag, Zn*)

601-N. Effect of Composition on the Ms and Decomposition Temperatures in Stainless Steels. F. C. Monkman, F. B. Cuff and N. J. Grant. Massachusetts Institute of Technology. *U. S. Office of Technical Services,* PB 125891, 18 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.40; Photostats $3.30.)

Martensite reaction is followed in simple 18-8 stainless steels by electrical resistivity. A linear equation is determined by the method of least squares relating the alloy composition and the temperature at which martensite is first observed to form during cooling. Decomposition of martensite at elevated temperatures investigated by electric resistivity measurements; decomposition products examined metallographically. (N8p, 2-60; SS)

602-N. Influence of Oxygen on the Transformation Characteristics of Some Titanium-Molybdenum Alloys. George L. Kehl and Alfred E. Riccardo. Columbia University School of Mines. *U. S. Office of Technical Services,* PB 125957, Oct. 1955, 83 p. (Available at Library of Congress, Washington, D. C.—Microfilm $4.80; Photostats $13.80.)

Influence of dissolved oxygen in the Ti-Mo alloys investigated was to shorten the time for initiation and completion of isothermal transformation and to raise the region of rapid transformation of the T-T-T curve to higher temperature levels. (N7c; Ti-b, *Mo*)

603-N. Self-Diffusion in Germanium. Harry Letaw, Jr., W. M. Portnoy and L. Slifkin. Illinois Engineering Experiment Station. *U. S. Office of Technical Services,* PB 125958, May 1956, 15 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.40; Photostats $3.30.)

In the temperature range 766-928° C., self-diffusion coefficient of Ge is represented by D-7.8 exp (−68,500/RT) sq. cm. per sec. The probable errors in the frequency factor and activation energy are ± 3.4 sq. cm. per sec. and ± 0.96 k. cal. per mol., respectively. (N1d; Ge)

604-N. Transformation in Disordered Gold Copper Alloys. G. C. Kuczynski, M. Doyama and M. E. Fine. Northwestern University. *U. S. Office of Technical Services,* PB 126302, Mar. 1956, 21 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.70; Photostats $4.80.)

Measurement of specific heat, temperature coefficient of expansion, Young's modulus and yield point in Cu_3Au alloys establishes a phase transition between 550 and 600° C. and possibly another one near 850° C. The temperature of the 550-600° C. transition decreases sharply as the composition of the alloy deviates from Cu_3Au.
(N10a; Cu, Au)

605-N. Investigation of Beta Phase "Recrystallization" in Ti-3%Al-5% Cr Alloy. Naval Research Laboratory. *U. S. Office of Technical Services,* PB 131338, Nov. 1957, 22 p. $.75.

Possibility of controlling beta grain size during heat treatment of binary and ternary Ti alloys with Al and Cr, and effects on mechanical properties. Beta grain behavior was studied in the composition ranges of commercial MST Ti-3Al-5Cr alloy. A preliminary transformation temperature survey was made. (N5, M27c, 2-63; Ti-b, *Al, Cr*)

606-N. Research on the Effects of Stress, Strain, and Temperature on the Eutectoid Decomposition of Titanium Alloys. Adolph W. Goldstein, Arthur G. Metcalfe and William Rostoker. Armour Research Foundation. *U. S. Office of Technical Services,* PB 131610, Nov. 1957, 72 p. $2.

Three Ti-Cr alloys were forged in the alpha-beta range to give six systems with controlled amounts of each phase. The isothermal transformation at 400, 500 and 600° C. of each system was followed by resistivity, X-ray diffraction, elastic modulus measurements and metallography. Reactions occurring in the transformation were identified where possible. This transformation study was repeated under a stress which produced 1% creep in 1000 hr. An acceleration of four to seven times in the rate of transformation occurred under the action of this stress. (N9, N7c; Ti)

607-N.* (German.) **Structures Resulting From Precipitation of Cementite in Ferrite.** Wolfgang Pitsch and Angelica Schrader. *Archiv für das Eisenhüttenwesen,* v. 29, Aug. 1958, p. 485-488.

Investigations on the similarity in orientation of ferrite and cementite particles which have been precipitated from the ferrite. Direct electron microscope pictures of particles and electron diffraction pictures. Similarity in the atom structure suggests preference for $[111]_\alpha$ and $[010]_\alpha$ planes. 6 ref. (N8j; ST)

608-N.* (German.) **X-Ray Examination of Stacking Defects in Cold Formed Alpha-Iron.** Christian N. J. Wagner. *Archiv für das Eisenhüttenwesen,* v. 29, Aug. 1958, p. 489-493.

Chips from pure alpha iron were produced at room temperature under liquid nitrogen. Position and form of the intensity distribution diagrams of various Debye-Scherrer-lines were measured with filtered Co and Mo rays and with a Norelco diffractometer. A line spread was observed after cold deformation but no line shift. The particle spread is dependent on the crystallographic orientation and can be explained through stacking defects in the (211) planes of the lattice structure. 24 ref. (N8j; M22g; Fe)

609-N.* (German.) **Grain Size in the Hardening of Gold-Platinum Alloys.** H. Schmid. *Metall,* v. 12, July 1958, p. 612-619.

Gold-platinum alloys with 50 to 75% Au and 25 to 49% Pt tend to have strong grain segregation which increases up to 50% Pt and which is still in existence after 14th annealing at 1000° C. Rh additions have no effect on this phenomenon. Pt-rich alloys have finer grains than those with low Pt content. Grain grows with increasing homogeneity of castings. Alloys between 30 and 50% Pt show better hardenability without Rh. Phase diagrams are given, and diagrams for strain, tensile strength, hardness as a function of annealing time and per cent Pt. 15 ref. (N3, J23; Au, Pt)

610-N.* (German.) **Structural Transformations of Austenitic Steels Subject to Long-Time Strain Tests.** Walter Koch, Angelica Schrader, Alfred Krisch and Helga Rohde. *Stahl und Eisen,* v. 78, Sept. 4, 1958, p. 1251-2162.

Four Cr-Ni steels, two of which were Cb-stabilized and one of which contained approx. 2% Mo, were subjected to long-time stress of 0 to 40 kg. per sq. mm. at 600-700° C., and up to 50,000 hr. Under these conditions, initially the MeC carbide of the stabilizing element was precipitated. Later the $Me_{23}C_6$ carbide was reduced again after a certain time and disappeared with the formation of the sigma phase. 15 ref. (N8, 3-68; AY)

611-N.* (Russian.) **Effect of Nitrogen on Austenite Grain Growth of Medium-Carbon High-Phosphorus Steel.** V. N. Svechnkov and I. Kh. Truzh. *Metallovedenie i Obrabotka Metallov,* v. 4, Sept. 1958, p. 15-19. (Henry Brutcher, Altadena, Calif., Translation no. 4350.)

Combined effect of increased phosphorus-nitrogen content on grain size of medium carbon steel and changes occasioned by increased temperature. Tests conducted with bessemer rail steel (0.07% P). Results of metallographic study show that steels with 0.025% N show numerous clearly defined deformation lines in the ferrite. They are also present in steels with 0.006% N, but in considerably fewer numbers. Introduction of Al reduces number of these deformation lines. With 0.4% Al an agglomeration of these lines is noted. 13 ref.
(N3, 2-60; CN)

612-N.* (Russian.) **Transformations During Heating of Quenched White Iron.** F. K. Tkachenko and V. F. Zubarev. *Metallovedenie i Obrabotka Metallov,* v. 4, Sept. 1958, p. 24-26. (Henry Brutcher, Altadena, Calif., Translation no. 4352.)

Study made by simultaneous recording of thermal, dilatometric and magnetic curves during heating and cooling of specimens. Objects were heated with 800, 900, 950 and 1000° temperatures at 30-min. exposures. The magnetic transformation taking place in the ferrite of white iron goes below the Ac_1 point. At the second temperature levels the residual austenite is transformed into martensite and the magnetic transformation of carbides of unknown composition. (N8; CI-p)

613-N.* Interaction of Dislocation With Atomic Order in Solid Solutions. Koji Sumino. *Tohoku University, Science Reports of the Research Institutes,* v. 10, Aug. 1958, p. 283-298.

Interaction energy and locking force against the motion of the dislocation are calculated for the superlattice of a beta-brass type al-

loy; effect of thermal motion on the locking force. Interaction energy and locking force for an edge dislocation reveal a sharp peak at the Curie point of order-disorder transformation, while such a sharp peak is absent in a screw dislocation. (N10, M26b; Cu-b)

614-N.* Diffusion of Calcium in Liquid Slags. Tunezo Saito and Kazuo Maruya. *Tohoku University, Science Reports of the Research Institutes,* v. 10, Aug. 1958, p. 306-314.

Self-diffusion coefficients of Ca in molten slags (CaO-SiO_2, CaO-Al_2O_3, and CaO-SiO_2-Al_2O_3-MgO systems) were measured in the temperature range from 1350 to 1600° C. Diffusion coefficient has good correspondence to both the specific electric conductivity and the viscosity coefficient. Some behaviors of Al_2O_3 and MgO in basic slags. (N1d; RM-q, Ca)

615-N. Irradiation Induced Phase Changes in Uranium-Base Alloys. M. L. Bleiberg. Second United Nations Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/619, 1958, 13 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Kinetics of the phase reversal were studied by continuous measurements of the electrical resistivity of U alloy with 9% Mo while under pile-irradiation and at low temperatures. Changes in temperature coefficient of electrical resistivity were measured as a function of exposure. 10 ref. (N6p, 2-67; U-b, *Mo*)

616-N. Transformation Kinetics of Plutonium. R. D. Nelson and I. D. Thomas. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1030, 1958, 11 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Alpha → beta, beta → gamma and gamma → delta transformations in Pu studied by fluid displacement measurements. Heating and cooling curves, isothermal reaction curves showing the fraction transformed as a function of time, T-T-T curves, were obtained by this technique. (N6p; Pu)

617-N.* (French.) **Study of the Nucleation of Graphite and the Kinetics of Graphitization in Prehardened White Cast Irons. Pt. 2.** Pierre Laurent and Michel Ferry. *Fonderie,* no. 150, July 1958, p. 319-337.

Graphitization at temperature lower than that of eutectoid transformation point: number of particles of graphite obtained by isothermal treatment, speed of graphitization between 500 and 700° C., relationship between number of nuclei and speed of graphitization, variations in Vickers hardness during isothermal transformation, incubation period. Also, comparative study of kinetics of graphitization of hardened and nonhardened irons. (To be continued.) (N2, N8s; CI-p)

618-N.* (French.) **Iron Containing Diffused Graphite Produced by Annealing. Physicochemical and Metallographic Aspects.** J. Pomey. *Revue Universelle des Mines,* v. 14, 9th Series, Sept. 1958, p. 293-300.

Formation and evolution of transition carbides from martensite or bainite; epitaxic germination of graphite from hexagonal carbide; morphological and kinetic aspects of growth of graphite. Heat treatment of iron containing diffused graphite; mechanical properties of this iron. (N8s, J23; CI)

619-N.* (German.) **Strain Aging of Soft Iron Retarded by Phosphorus.** Friedrich Erdmann-Jesnitzer and Willi Dehnke. *Bergakademie,* v. 10, May-June 1958, p. 321-327.

Samples from melts with 0.02-0.07% C, 0.01% Si, 0.08-0.12% Mn, 0.006-0.073% P, 0.021-0.022% S, 0.013-0.014% N and 0.011-0.014% O were rolled and tested. Strain aging tendency studied by determination of elastic limit and increase of hardness after pre-straining and aging. Strain aging decreases within the range of 0.006 to 0.073% P. 15 ref. (N7e, 2-60; Fe, *P*)

620-N.* (German.) **Recrystallization of Magnesium in the Presence of Trace Elements.** Friedrich Erdmann-Jesnitzer and Ingrid Otto. *Bergakademie,* v. 10, May-June 1958, p. 328-333.

Experiments on the recrystallization temperature in relief annealing. Two Mg samples (with 0.08 wt % = 0.07 at. % and 0.44 wt. % = 0.40 at. % Al) and two other samples (with 0.08 wt. % = 0.035 at. % and 0.95 wt. % = 0.40 at. % Fe) were deformed by rolling and relief annealed. The recrystallization temperature was shifted to higher values by the added elements, especially by irons. 63 ref. (N5f, 2-60, 2-61, 2-64, 3-68; Mg-f, *Fe*)

621-N.* (Swedish.) **Strain Aging of High-Carbon Steels.** *Jernkontorets Annaler,* v. 142, no. 8, 1958, p. 515-535.

Mechanism governing improvement in elastic properties of high-carbon steels during annealing in the temperature range 150-300° C. Aging occurred in comparison with mild steel only after a considerable time delay, which increases with carbon content, particularly at more than 0.6-1.0% C. A suggested explanation of this delay is that those dislocations first to acquire a solute atmosphere would not have contributed to further slip, whether pinned or not. Solute pinning is considered to develop first at pile-up with large stress fields. 39 ref. (N7e, CN-r)

622-N.* (Russian.) **Polygonization of Cast Metals and Alloys.** B. A. Movchan. *Doklady Akademii Nauk SSSR,* v. 120, no. 3, 1958, p. 521-522.

Pure Cu and Ni test pieces vacuum cast and examined by microscope for structure changes. Micrographs of steels Kh25N20 and Kh8N13 and of the alloy Ni + 0.62 Cb. Structure change thought to be a consequence of boundary dislocations taking place in cooling. 5 ref. (N5; Cu, Ni, 5-60)

623-N.* (Russian.) **Influence of Small Additions on Diffusion Coefficients in Polycrystalline Metals. Pt. 2.** V. I. Arkharov, S. M. Klotsman and A. N. Timofeev. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 255-260.

Radiometric investigation of influence of 0.1% Be on intercrystalline diffusion of Ag in polycrystalline Cu. In alloys with Be the coefficient of intercrystalline diffusion of Ag is higher than in pure Cu. Hence, the volume of change of this coefficient is dependent on the preliminary treatment of the alloy. Conclusions as to the adsorbtive activity of Be in Cu and dependence of the concentration of Be in intercrystalline transitional zones on temperature. 13 ref. N1, 2-60, 2-61; Ag, *Be,* Cu)

624-N.* (Russian.) **Spheroidization of Graphite in Iron Treated With Magnesium.** A. Ya. Khronov. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 281-288.

The form of graphite in magnesium iron is closely related to the surface tension. The higher the surface tension the more compact the form of graphite. The decisive influence in the process of spheroidization of graphite is the supercooling of the iron. Studies were made on influence of addition of metallic Mg on surface tension of iron and form of precipitation of graphite. Iron was melted in Kryptol electric furnace with magnesite lining and capacity of 800 g. 31 ref. (N8q; CI-r, *Mg*)

625-N. Growth and Definition of Bicrystals. R. Wegener and H. F. Matare. *Electrochemical Society,* Abstract no. 59, May 1957, p. 111-116.

Bicrystals used to study effect of grain boundaries on mechanical and electrical properties and diffusion in metals. (N3, N1)

626-N. Impurity Diffusion in Germanium and Silicon. M. Tanenbaum. *Electrochemical Society,* Abstract no. 60, May 1957, p. 120-125.

Solid state diffusion in semiconductors. 16 ref. (N1; Ge, Si)

627-N. Evaporation and Alloying of Metals to Silicon. J. M. Goldey, M. Tanenbaum and N. Holonyak, Jr. *Electrical Society,* Abstract no. 64, May 1957, p. 133-137.

Materials found useful as alloying agents are Al and Au-Sb (0.01-2% Sb). In the evaporation process the alloying agent arrives at the semiconductor in an atom by atom fashion, thus leading to intimate contact which is essential to uniform wetting. (N16n, P15g; Si, *Au, Sb*)

628-N. Diffusion of Gallium in Silicon. *Journal of Applied Physics,* v. 29, Oct. 1958, p. 1456-1459.

Diffusion investigated over a temperature range of 1130-1358° C. using an open-tube vapor-solid diffusion technique at atmospheric pressure. 8 ref. (N1; Ga, Si)

629-N. Observations of Dislocations in Iron Whiskers. R. V. Coleman. *Journal of Applied Physics,* v. 29, Oct. 1958, p. 1487-1492.

Etching of iron whiskers in picral and nital etchants studied and etch-pit configurations in certain areas of as-grown whiskers observed. Dislocations introduced by plastic deformation of the whisker investigated and arrays of dislocations produced by annealing the deformed whiskers studied. (N3r, M26b; Fe, 14-61)

630-N. Germanium Diffused Minicrystals and Their Use in Transistors. I. A. Lesk and R. E. Coffman. *Journal of Applied Physics,* v. 29, Oct. 1958, p. 1493-1494.

The diffused minicrystal process yields a Ge drift p-n-p bar-type transistor structure that has fewer practical limitations on emitter, base and collector resistivities and on base width, than other processes. 10 ref. (N3r, T1k; Ge)

631-N. Temperature Dependence of the Phase Transition in Cerium. R. Herman and C. A. Swenson. *Journal of Chemical Physics,* v. 29, Aug. 1958, p. 398-400.

The cubic-condensed cubic transition in Ce observed as a function of temperature and pressure from 360° K. and 11,000 atm. to 78° K. and zero pressure. (N11h, 2-61; Ce)

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

632-N. Diffusion of Indium in Tin Single Crystals. Anton Sawatzky. *Journal of Applied Physics,* v. 29, Sept. 1958, p. 1303-1305.

(N1a; In, Sn, 14-61)

633-N. Alloy Junctions in Semi-Conducting Devices. D. F. Taylor. *Research Applied in Industry,* v. 11, Sept. 1958, p. 335-338.

(N12; EG-j, Al, Si)

634-N. Diffusion of Silicon and Manganese in Liquid Iron. Pt. 1. Diffusion in Liquid Iron Saturated With Carbon. Tunezo Saito and Kazuo Maruya. *Tohoku University, Science Reports of the Research Institutes,* v. 10, June 1958, p. 259-268.

(N1; Fe, *Si, Mn,* 14-60)

635-N. Recovery and Recrystallization of Aluminum. Recent Investigations of Super-Purity and Commercial Purity Aluminum. D. Altenpohl. *Aluminium,* v. 33, May 1957, p. 306-317. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1329.)

Previously abstracted from original. See item 197-N, 1957.
(N5; Al-a)

636-N. Influence of Neutron Irradiation on Martensite Transformations. A. I. Zakharov and O. P. Maximova. *Doklady Akademii Nauk SSSR,* v. 114, 1957, p. 1195. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4067.)

(N8p, 2-67)

637-N. Relationships of the Diffusion and Lattice Reorganization Process During Decomposition of Solid Solutions. Y. A. Bagaryatskii and Y. D. Tyapkin. *Doklady Akademii Nauk SSSR,* v. 115, 1957, 6 p. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4008.)

(N1c, M27b)

638-N. Use of X-Ray Goniometric Methods for Determination of the Mutual Orientation of Phases. Pt. 3. X-Ray Study of the Aging of Aluminum Alloys. Y. A. Bagaryatskii. *Fizika Metallov i Metallovedenie,* v. 1, no. 2, 1955, p. 316-329. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB33.)

Previously abstracted from original. See item 189-N, 1956.
(N7, M23c; Al, *Cu, Mg*)

639-N. Ordering Mechanism of an Ni_3Mn Alloy With Different Molybdenum Additions. B. G. Lifshits, B. V. Molotilov, N. N. Muller and N. A. Savost'ianova. *Fizika Metallov i Metallovedenie,* v. 3, 1956, p. 477-485. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4249.)

(N10, 2-60; Ni, *Mn, Mo*)

640-N. Study of Diffusion of Carbon in Nickel and Its Alloys Using the Radioactive Isotope C^{14}. P. L. Gruzin, Y. A. Polikarpov and G. B. Fedorov. *Fizika Metallov i Metallovedenie,* v. 4, 1957, p. 94-102. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4269.)

Previously abstracted from original. See item 385-N, 1957.
(N1, 1-59; Ni, *C*)

641-N. Dynamics of the Solidification of Castings. I. D. Semikin and E. M. Gol'dfarb. *Liteinoe Proizvodstvo,* no. 2, 1956, p. 16-22. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4464.)

(N12, E25n)

642-N. Analytical Solutions of Elementary Problems in the Solidification of Castings of Various Shapes. N. G. Girshovich and Y. A. Nekhendzi. *Liteinoe Proizvodstvo,* no. 3, 1956, p. 14-19. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4462.)

Previously abstracted from original. See item 244-N, 1956.
(N12, E25n)

P Physical Properties

594-P. Temperature Dependence of Magnetic Properties of Silicon-Iron. C. W. Chen. *Journal of Applied Physics,* v. 29, Sept. 1958, p. 1337-1343.

Permeability, coercive force, remanence and hysteresis and core losses of a 3% singly oriented Si-Fe alloy measured in the range 30 to 700° C. Their temperature dependence is interpreted in terms of either the intrinsic properties of a ferromagnetic or domain theory. The magnetization curve is analyzed on the basis of the crystallographic characteristics of the texture in the material. Domain distribution is discussed at each stage of magnetization. Application of the analysis leads to the establishment of the relationship between the temperature coefficient of permeability and the magnetization processes. (P16, 2-61; Fe-b, *Si,* SGA-n)

595-P.* Thermal Properties of Mobile Defects. Andrew Granato. *Physical Review,* v. 111, Aug. 1, 1958, p. 741-746.

Using simplified models, calculations are made for the contribution of mobile dislocations and small-angle boundaries to the specific heat and thermal resistivity of crystals. The specific heat is found to be proportional to T and T^2, and the lattice resistivity approximately to T^{-n} (where n lies between 3 and 7/2 for the usual range of measurements) and T^{-5} for mobile dislocations and mobile small-angle boundaries, respectively, over a range of low temperatures, but eventually both go to zero in the limit as the temperature approaches zero.
(P12r, P11h)

596-P.* Theory of the Anharmonic Properties of Solids. Edward A. Stern. *Physical Review,* v. 111, Aug. 1, 1958, p. 786-797.

A theory with which one can calculate the anharmonic properties of solids such as thermal expansion, temperature dependence of elastic constants, dependence of elastic constants under stresses, and the deviation of the specific heat from the Dulong-Petit law at high temperatures. The theory is applied to sodium under the assumption of a special force interaction between nearest neighbors only.
(P11g, P12r, Q21e)

597-P.* Quenched Imperfections and the Electrical Resistivity of Aluminum at Low Temperatures. Warren DeSorbo. *Physical Review,* v. 111, Aug. 1, 1958, p. 810-812.

Electrical resistivity of a high-purity Al specimen, having different concentrations of "quenched in" lattice defects is reported for the temperature region 1-20° K. For small and different concentrations of structural impurities, the resistivity follows Matthiessen's rule. The exponential constant, n, in the equation, $p = pi + AT^N$, is equal to 2.7 for the sample in a well-annealed state. This number increases slightly with an increase in defect concentration.
(P15g, M26s, 2-63; Al)

598-P. Effects of High Temperature on the Performance of Alnico V and Alnico VI Permanent Magnets. W. H. Roberts and D. L. Mitchell. General Electric Co., Atomic Products Div. *U. S. Atomic Energy Commission APEX-384,* Feb. 1957, 90 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $2.25.

Design parameters and limitations of permanent magnets for applications involving high and low temperatures and vibration. Temperature range in the investigation included −70° C. to 600° C., with the emphasis placed on long-time operation at 500° C.
(P16, 2-62; Al, Ni, SGA-n)

599-P.* (English.) **Note on the Magnetic Susceptibility of Dilute Cu-Mn Alloys.** A. J. Dekker. *Physica,* v. 24, Aug. 1958, p. 697-706.

On the basis of a simple model, the following features of the susceptibility of dilute Cu-Mn alloys are discussed: the concentration dependence of the effective Curie temperature in the high-temperature region; the occurrence of a "gradual" antiferromagnetic transition at low temperatures; the concentration dependence of the position and shape of the antiferromagnetic transition. 5 ref. (P16; Cu, *Mn*)

600-P. (Czech.) **Zinc Telluride as a Semiconductor.** Horak Jaromir, Machovec Mojmir and Kosek Frantisek. *Ceskoslovensky Casopis pro Fysiku,* v. 7, no. 4, 1957, p. 361-368.

ZnTe was synthesized in pure nitrogen at 800° C. Conductivity was measured in a temperature range from 0 to 140° C. using a thin Cu-Zn Te-Cu layer. No photo-effect was observed in ZnTe. Thermal emf. was measured with a Cu-ZnTe contact.
(P15g; Zn, *Te,* 14-68)

601-P. (Korean.) **Thermoelectric Emission in the Process of Melting of Metals.** Mak Zo Ik. *Kvazhak ka Kisul',* no. 7, 1955, p. 38-41.

Connection between thermo-electric emission and work function, relationship of work function to crystallographic directions, relationships of thermo-electric emission and work function to temperature. Research into change in thermo-electric emission during melting of metals. (P15k, P12)

602-P. (Polish.) **Effect of Cathodic Hydrogen on the Magnetic Properties of Chromium-Nickel Austenitic Steel.** L. Kozlowski. *Bulletin de l'Académie Polonaise des Sciences, Troisieme Classe,* no. 5, 1957, p. 519-522.

Variation of the magnetic saturation of austenitic steel as a function of time of cathodic polarization. Restoration of magnetic properties and determination of thickness of surface layer encompassed in the variation of magnetic saturation. Results confirm the conclusion that cathodic hydrogen occurs in austenitic steel only in a thin surface layer of several microns.
(P16; SS)

603-P.* (Russian.) **Theory of Absorption Spectra in Solids.** V. A. Trapez-

nikov. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 8-16.

X-ray absorption spectra in solids, in accordance with the theory proposed by A. I. Kostarev, are conditioned by dispersed electronic waves emitted by nearest surrounding atoms. This phenomenon depends on coordinating force, radius of coordinating atomic shell and on the nature of surrounding atoms. Heat oscillated atoms influence thin layers of atoms in the region of absorption. 13 ref. (P17, M25)

604-P. (Russian.) **Some Features of the Change of Galvanometric Properties in Relation to the Composition of Alloys.** N. V. Grum-Grzhimailo. *Zhurnal Neorganicheskoi Khimii*, v. 1, no. 6, 1956, p. 1361-1367.

On curves of the relationship of Goldhammer effect composition of Co-Ni, Fe-Co, Fe-Ni, Fe-Co-Ni and Fe-Cu-Ni alloys, breaks corresponding to multiple proportions of atomic concentrations are observed. These compositions are taken to correspond with the compositions of chemical compounds present in solid solution. In the system Co-Ni a break in the curve corresponds to the composition $CoNi_6$ but a discontinuous change of the curve corresponds to CoNi. In the system Fe-Co the compounds Fe_4Co_2 and $FeCo_2$ are observed.
(P15, 2-60; Co, Ni)

605-P.* **Magnetic Core Materials.** *Iron Age*, v. 182, Oct. 16, 1958, p. 190-191.

Magnetic materials are the heart of most electrical machinery. They can be divided into two classes, soft and hard. Materials of soft cores are silicon iron, Ni-Fe alloys. Materials of permanent magnets are high-carbon steel; Co, Mo and W alloys; Al-Ni-Co-Fe alloys; Cu-Ni-Co alloys; Ag-Mn-Al alloys; Co-V-Fe iron alloys. Description, special properties, typical applications.
(P16, 17-57; SGA-n)

606-P.* **Decomposition of Hydrogen Peroxide on Antimony and Bismuth Alloys.** P. P. Clopp and G. Parravano. *Journal of Physical Chemistry*, v. 62, Sept. 1958, p. 1055-1059.

Kinetic parameters correlated with changes in the electronic structure of Bi and Sb. 26 ref.
(P15, P13c; Sb-b, Bi-b)

607-P.* **Interactions of Metals With Their Molten Salts. Pt. 1. The Nickel-Nickel Chloride System.** J. W. Johnson, Daniel Cubicciotti and C. M. Kelley. *Journal of Physical Chemistry*, v. 62, Sept. 1958, p. 1107-1109.

Nickel has appreciable solubility in molten nickel chloride. The depression of the freezing point of nickel chloride (1009.1°) by the dissolved metal was measured and a eutectic point found at 977.5° and 9 mole % Ni. Constitution of the solution discussed in the light of the freezing point depression. 7 ref.
(P12n, P12s; Ni)

608-P.* **Structural Peculiarities of Liquid Alloys in Certain Binary Systems.** D. K. Belashchenko. *Academy of Sciences of the USSR, Proceedings*, v. 115, 1957, p. 665-668. (Translation by Consultants Bureau, Inc.)

Viscosity and electrical resistance of Sb-Sn, Cd-Sb, Cd-Cu, Pb-Ti, Bi-Ti and Fe-Ni liquid alloys.
(P10f, P15g; Sb, Sn, Cd, Cu, Pb, Tl, Bi, Fe, Ni, 14-60)

609-P.* **Determination of the Iron Vapor Pressure Over Austenite.** E. Z Vintaikin. *Academy of Sciences of the USSR, Proceedings*, v. 115, 1957, p. 723-725. (Translation by Consultants Bureau, Inc.)

Vapor pressure found to vary inversely with temperature. Varies from straightline curve over austenite, but not over pure iron. 6 ref. (P12c; Fe)

610-P.* **Transformation in Ternary Solid Solutions Based on Ni_3Fe.** M. P. Ravdel and Ya. P. Selissky. *Academy of Sciences of the USSR, Proceedings*, v. 115, 1957, p. 733-735. (Translation by Consultants Bureau, Inc.)

Change in various physical and magnetic properties as Cu, Cr, Mo, Mn, Si, W, V are added in small amounts to Ni_3Fe alloy. 5 ref.
(P-general, M24c; Ni, Fe, *Cu, Cr, Mo, Mn, Si, W, V*)

611-P.* (English.) **Radiation Effects in Solids.** R. Smoluchowski. *Nuovo Cimento, Supplemento*, v. 7, no. 2, 1958, p. 523-543.

7 ref. (P-general, Q-general; 2-67)

612-P.* (French.) **Thin Ferromagnetic Films. Hall Effect in Thin Films of Nickel.** G. Goureaux, P. Huet and A. Colombani. *Comptes Rendus*, v. 247, July 16, 1958, p. 189-193.

Principal experimental results concerning Hall effect in thin films of Ni measured at ambient temperature in magnetic field varying from 10 to 35,000 Oersteds located perpendicular to plane of film. Longitudinal feed current is alternate, with frequency of 50 to 2000 Hz. For thicknesses studied, Hall effect is not modified by frequency variations in this range.
(P15, P16; Ni, 14-62)

613-P. **Superconducting Transition in Aluminum.** John F. Cochran and D. E. Mapother. *Physical Review*, v. 111, July 1, 1958, p. 132-142.

(P15g; Al)

614-P. **Reflection of Slow Electrons From the Surface of Pure Tungsten and From Tungsten Covered With Thin Films. Pt. 2.** D. A. Gordetskii. *Soviet Physics-JETP*, v. 34(7), July 1958, p. 4-9.

Reflection of slow electrons from monocrystalline W and from W crystals on which a layer of W has been deposited by evaporation, under conditions of ultra-high vacuum to insure a clean surface. Anomalous changes occur in the reflection coefficients when thin layers of Ba, BaO and Ba-O are applied to a W single crystal; possible explanation. 20 ref. (P15k, P17a; 14-61, W, Ba)

615-P.* **Effects of Cold Work and Quenching on the Magnetic Susceptibility of a Commercial Titanium Alloy.** Y. L. Yao. *American Society for Metals, Transactions*, v. 51, Preprint no. 114, 1958, 9 p.

The mean susceptibility of Ti-140A measured at room temperature increases with cold work and quenching. While the annealing of most cold worked and all quenched samples at 300° C. for 4 hr. almost wipes out this increase, the identical annealing of lightly deformed samples may cause a further increase. The anomalous effects of low-temperature annealing may be connected to strain aging. Tentative explanations as to what causes the change of the mean susceptibility have been made and some applications are given. 13 ref.
(P16, 2-64, 3-68; Ti-b)

616-P.* (German.) **Viscosity of Cast Iron.** Anton Koniger. *Giesserei*, v. 45, Sept. 11, 1958, p. 549-556.

Describes a viscosimeter, the main part of which is a rotating disk for immersion in the liquid iron. Resistance against rotation exerted by the iron is measured electrically. Fluidity of cast iron increases with the phosphorus content while tensile strength is decreased.
(P10f, 1-53, E25p; CI)

617-P. **Thermoelectric Power of Dilute Indium-Lead and Indium-Thallium Alloys.** W. J. Tomasch and J. R. Reitz. *Physical Review*, v. 111, Aug. 1, 1958, p. 757-764.

(P15; In, Pb, Tl)

618-P. **Design Properties of Sinterings. Pt. 1. Nonferrous Alloys.** *Precision Metal Molding*, v. 16, Oct. 1958, p. 54-56.

Typical properties of sinterings for design use-density, ultimate tensile strength, elongation, Rockwell hardness—for some 60 Cu-base alloys. (P10a, Q27a, Q29n; Cu-b, 6-72)

619-P. **Reactivity of Certain Uranium Oxides With Aluminum.** Terminal Report. A. L. Eiss. Sylvania-Corning Nuclear Corp. *U. S. Atomic Energy Commission, SCNC-257*, Feb. 10, 1958, 26 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) \$.75.

The reaction of uranium dioxide with Al studied at 450, 500 and 600° C. In most cases reaction at 600° C. occurred within a few hours, whereas reactions at 500° were hardly observed before a time period of several days. The method of manufacturing UO_2 has a pronounced effect on its reactivity.
(P13b; P, Al)

620-P.* (French.) **Energy Spectra of the Secondary Electrons Emitted by a Metal Under the Action of a Beam of High-Speed Ions.** F. Pradal and R. Simon. *Comptes Rendus*, v. 247, July 28, 1958, p. 438-441.

Spectra were analyzed in an electron microscope with the help of a magnetic spectrograph. It is possible to assign to each metal a characteristic temperature of emission. 5 ref. (P15k)

621-P. (Russian.) **Electrical Conductivity of Aluminum.** A. P. Relyaev and R. M. Gol'shtein. *Tsvetnye Metally*, no. 5, 1957, p. 74-78.

Electrical conductivity of Al is influenced by a number of factors such as the degree of deformation and heat treatment conditions, but the decisive factor is the impurity content of the metal. Effect of Fe, Si, Cu, Ti, V and Cr on electrical conductivity of high-purity Al, and also on mechanical properties of Al wire. Electrolytically refined Al, containing 0.0017% Fe, 0.0025% Si and 0.002% Cu, has a specific electrical conductivity at +20° of 38 m/ohm. per sq. mm., which is 57% of that of Cu. (P15g; Al)

622-P. (Russian.) **Effect of Composition of Aluminum-Zinc Alloys on the Magnitude of the Dimensional Changes in Specimens Due to Cyclic Heat Treatment.** A. A. Bochvar and P. K. Novk. *Doklady Akademii Nauk*, v. 112, no. 6, 1957, p. 1041-1042.

Pure Al, pure Zn and Al-Zn alloys were studied. The length of pure Al and Zn specimens increased as a result of cyclic heat treatment in the range 13-340° C., whereas the alloys containing 75-90% Zn

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

decreased in length. A hypothesis is advanced relating to the mechanism of plastic deformation due to cyclic heat treatment and a curve shows the change in length after 60 cycles, as a function of alloy composition. (P10d, 2-64; Al, Zn)

623-P. (Russian.) **Magnet Type Alloys With a Decreased Cobalt Content.** L. M. Germash, A. M. Morogova and M. S. Yanskaya. *Metallovedenie i Obrabotka Metallov,* no. 6, 1957, p. 8-10.

Possibility of decreasing Co content in magnet-type alloy while retaining maximum magnetic energy, remanence and coercive force. A lowering in Co content from 24 to 21% has no substantial bearing on the optimum cooling velocity and does not require the application of greater magnetic poles in the thermomagnetic treatment.
(P16, 2-60; SGA-n)

624-P. Research on Aluminum Antimonide for Semiconductor Devices. A. Herczog, R. R. Haberecht and A. E. Middleton. P. R. Mallory & Co. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131849, Mar. 1958, 39 p. $1.

Purification and crystal growing techniques for obtaining suitable aluminum antimonide material. Chemical, physical and electrical characteristics of these crystals, techniques for making ohmic contacts and p-n junctions and feasibility of devices such as rectifiers and transistors for operation at 500° C. Difficulties encountered with carbon impurities and ineffectiveness of zone refining techniques to alleviate this problem. From the available material, point contact and grown junction diodes were made which showed rectification up to 200-250° C.
(P15g; Al, 14-68, SGA-r)

625-P.* Anodic Behavior of Nickel. Pt. 1. Effect of Components of Electrolyte. Nelson F. Murphy and Bharat C. Oza. *Virginia Polytechnic Institute. Bulletin,* v. 51, May 1958, 18 p.

Quantitative effects of constituents of electrolyte on the behavior of three Ni anodes. The anode potential and current density at which Ni became passive was found to be a reproducible value that increased as temperature increased. Effect of fluoride ion in destroying passivity of Ni studied quantitatively. The limiting current density was increased by presence of sulphate ion, the magnitude of the increase depending on the concentration of Ni in the solution. Boric acid did not affect limiting current density at low concentration of Ni ion but had appreciable effect at higher Ni concentrations. 13 ref. (P15; Ni)

626-P.* Role of Adsorption in Production and Measurement of High Vacuum. Chikara Hayshi. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 13-26.

Expressions describing effects of adsorption on gas flow in high vacuum on leak detection, on vacuum measurement and on behavior of water vapor and oil vapor in high-vacuum apparatus.
(P13, X-general, 1-73)

627-P.* Utilization of the Surface Tension of Liquid Metals in Making High-Vacuum Seals. Norman Milleron. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 38-41.

Eutectic alloy of Ga, In and Sn molten at room temperature with surface tension of 500 dyn per cm., vapor pressure of 10^{-8} mm. Hg at 500° C. and excellent wetting properties. Alloy can be utilized in valves, motion seals and flanged joints. Using ultrasonic technique, alloy readily wets W, Mo, Ta, SS, Pyrex, quartz and certain ceramics. 5 ref. (P12c, P13h, T7, 1-73; Ga, In, Sb, 14-60)

628-P.* Resistance-Temperature Characteristics of Evaporated Chromium Films. Dorothy M. Hoffman and Jacob Riseman. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 42-46.

Resistance-temperature characteristics of evaporated Cr films studied as a function of thickness. Resistivity ranged from 25 to 100 microhms per cm. corresponding to thickness from 1700 down to 70 Å for films prepared on substrates held at 25, 70 and 250° C.
(P15g, 2-61; Cr, 14-62)

629-P.* The Element Columbium and Its Compounds. James R. Darnell and L. F. Yntema. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, N. Y., 1958, p. 1-9.

Physical and chemical properties of Cb and characteristics of its binary compounds with C, B, Si, N and S. Temperatures of fusion and vaporization of columbium pentahalides. Formation and properties of pentoxide and other columbium oxides. Thermodynamic properties of Cb and Cb compounds at 25° C. 69 ref. (P12, P13; Cb, 14-68)

630-P.* (German.) **Sandwich Method in Construction of Airplanes and in Other Industries. Pt. 2.** B. R. Noton. *Aluminium,* v. 34, Sept. 1958, p. 522-529.

Thermal conductivity, density, specific strength for glass, cotton, paper, balsa wood, Al and stainless steel. Formulas for computing mechanical properties. Testing methods and instruments. (To be continued.) 6 ref. (P11g, P10a, Q-general, 1-53, 1-54; 7-59; Al, SS)

631-P.* (Japanese.) **Electronic Cooling and Heating by Semiconductors.** N. Makino and H. Shidara. *Metals,* v. 28, Oct. 1958, p. 785-788.

Semiconductors are classified as metallic crystals, valence bond crystals, ionic bond crystals and organic molecular bond crystals. Energy levels of crystals have, in general, band structure and show intrinsic conductivity. However, if there are impurity levels, the crystal has more conductivity and behaves as donor or acceptor. Semiconductors are used as resistors, thermisters, varisters, photoconductors, photocells and rectifiers.
(P15g, T1, 17-57; EG-j)

632-P. (Russian.) **Inherently Magnetically Soft Alloys for Impulse Technique and High-Frequency Telephony.** V. Ya. Skotnikov and K. D. Maryanova. *Sbornik Trudov (Tsentralny Nauchno-Issledovatelskii Institut Chernoj Metallurgii Institut Stali),* v. 15, 1956, p. 397-424.

A series of alloys, based on a 50-40% Fe-Ni alloy, has been developed, with a high electrical resistance, increased impulse permeability and low magnetic after effect, in the form of strip up to 0.02 mm. thick. Properties of the alloys, production technology, heat treatment and methods of electrical insulation between coils.
(P16, X15r, 17-57; Fe, Ni)

633-P. An Electrochemical Method for Determination of Saturation Pressure and Heat of Solution of Hydrogen in a Two-Phase Pd-H Alloy. Robert J. Ratchford and Gilbert W. Castellan. *Journal of Physical Chemistry,* v. 62, Sept. 1958, p. 1123-1127.

20 ref. (P12; Pd, *H*)

634-P. Carrying the Ball for Titanium. *Modern Metals,* v. 14, Oct. 1958, p. 66, 68, 69.

Characteristics of four new Ti alloys with great possibility in industrial application.
(P-general, Q-general, T24, 17-57; Ti)

635-P. Uranium. Pt. 3. Uranium Alloys and Dispersions. R. A. Noland, J. F. Schumar and J. H. Kittel. *Nucleonics,* v. 16, Aug. 1958, p. 89.

Dimensional changes of pure U, U-Cr, U-Mo, U-Pu, U-Zr, Th-U alloys and U_3Si under irradiation. 6 ref. (P10d, 2-67; U, Zr, Cr, Mo, Pu)

636-P. Surface Tension of Aluminum and Its Alloys. A. M. Korol'kov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* Feb. 1956, p. 35-42. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-46K21R.)

Previously abstracted from original. See item 252-P, 1956.
(P13h; Al)

637-P. (Dutch.) **Permanent Magnetic Properties of Some New Materials.** K. Tendeloo. *Metalen,* v. 13, Aug. 15, 1958, p. 268-272.

(P16, X11g; SGA-n)

638-P. Comparison of Calculated and Experimental Values for the Optical Reflectivity of the Liquid Alloys Hg-In, Hg-Tl, Ga-In at 25° C. L. G. Schulz. Institute for the Study of Metals. *U. S. Office of Technical Services,* PB 125900, Nov. 1956, 15 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.40; Photostats $3.30.)

(P17a; Hg, In, Tl, Ga, 14-60)

639-P. Electrochemical Behavior of Tin (Electrochemistry). Ugo Bertocci and Giovanni Serravalle. Politecnico di Milano. *U. S. Office of Technical Services,* PB 125980, Apr. 1956, 40 p. (Available at Library of Congress, Washington, D. C.—Microfilm $3; Photostats $6.30.)

(P15; Sn)

640-P. Temperature Variation of Intensity of Magnetization in Thin Nickel Films. A. M. Eich. Case Institute of Technology. *U. S. Office of Technical Services,* PB 126921, June 1956, 29 p. (Available at Library of Congress, Washington, D. C. —Microfilm $2.70; Photostats $4.80.)

Manner in which the intensity of magnetization of thin Ni film varies with temperature and film thickness studied with a magnetization hysteresis loop tracer. Films of thickness 35 to 1350 Å studied from approximately 10° K. to room temperature. (P16; Ni, 14-62)

641-P. Polarization Characteristics of Metals in Some Automotive Coolant Materials. M. Levy. Aberdeen Proving Ground. *U. S. Office of Technical Services,* PB 130193, Jan. 1957, 47 p. (Available at Library of Congress, Washington, D. C.—Microfilm $3.30; Photostats $7.80.)

Anodic and cathodic polarization measurements were made of steel-copper couples in tap water and 30% ethylene glycol environments treated with various inhibitor materials. (P15, R10b; ST, Cu)

642-P. Research in Electrical Properties of Intermetallic Compounds. Tien-Shih Liu and Renato Bobone. Horizons Inc. *U. S. Office of Technical Services,* PB 130839, July 1954, 50 p. (Available at Library of Congress, Washington, D. C.—Microfilm $3.30; Photostats $7.80.)

Preparation and electrical measurements of Ni-Al alloys and Ni-Al-Cu alloys in the cubic B region. Measurements show that the locus of minima of the resistivity for the Ni-Al-Cu ternaries is to be found within a strip containing the transition line from non-defect to defect structures. A qualitative explanation of the main features in the electrical behavior of the alloys, based on the Brillouin zone theory. (P15, M24c; Ni, Al, Cu, 14-68)

643-P. Partition of Soluble Carbon in Ti-6Al-4V Alloy. Richard D. Siebel, Richard L. Beck and Leonard E. Olds. Denver University Research Institute. *U. S. Office of Technical Services,* PB 131603, Nov. 1957, 78 p. $2.

Possible means for determining microdistribution of interstitial-type solutes such as nitrogen, oxygen and carbon, particularly in the more complex alloys. A useful method was developed for measuring microdistribution of solutes in alloys. (P12e; C, Ti, *Al, V*)

644-P. Effect of Temperature on the Magnetic Properties of Nickel-Iron Alloys. J. J. Clark and J. F. Fritz. Westinghouse Electric Corp. *U. S. Office of Technical Services,* PB 131799, Dec. 1957, 37 p. $1.

Normal magnetization curves for various temperatures between −60 and +250° C. are presented for six Ni-Fe alloys, together with curves illustrating behavior of saturation induction, remanence and coercivity over this temperature range. A dependence of d-c magnetic properties of Hipernik V and Deltamax alloys on temperature cycling is also reported. (P16, 2-61; Ni, Fe)

645-P.* A Study of the Interface Impedance Characteristics of Seven Commercial Cathode Nickel Alloys. C. D. Richard, Jr., and A. M. Bounds. *Electrochemical Society,* Abstract no. 82, May 1957, p. 192-194.

Alloys chosen were Inco 225, a high-Si active alloy; Inco 220, a low-Si, low-Mg alloy; Inco 330, a low-Si alloy with high Mg; Cathaloy A-30, an Al-Ni alloy; Cathaloy A-31, a W-Ni alloy; Cathaloy A-32, an Al-W-Ni alloy; and Cathaloy P-50, a pure Ni. (P15; Ni-b)

646-P.* (German.) **Influence of Annealing Gases on Magnetic Properties of Ferrites.** Carl Heck and Joachim Weber. *Archiv für das Eisenhüttenwesen,* v. 29, Aug. 1958, p. 495-504.

On a number of technically important Mn-Zn ferrites the influence of mixing rate, flux, annealing temperature and oxygen contents of annealing gases upon permeability and shape of hysteresis loop is investigated. It was found that annealing in air over too long periods is harmful. 21 ref. (P16, J23; Fe, *Mn, Zn,* SGA-n)

647-P.* (German.) **Magnetic Properties of Thin Layers.** H. Mayer. *Metalloberfläche,* v. 12, Sept. 1958, p. 257-262.

Study of thin ferromagnetic layers, orientation of magnetic particles, hysteresis loop, magnetic saturation, decrease of the Curie-temperature, increase of coercive force. Facts that can be important in the theory of magnetism as well as in the use of the above layers in electronic computers. 34 ref. (P16; SGA-n)

648-P.* (German.) **Soft Magnetic Materials Based on Iron-Silicon-Aluminum Alloys.** Gunther Rassmann, Erich Linder and Roland Wittig. *Neue Hütte,* v. 3, June 1958, p. 365-373.

Investigations on the unusual curves of permeability as a function of temperature in Fe-Si-Al alloys resulted in a relationship between composition of material and permeability. The same was found on metal powders, which can be used for magnetic cores of positive, negative or zero temperature coefficient. Sintered parts lend themselves well to applications where formerly only cast material could be used. 8 ref. (P16, 2-61; Fe, Si, Al, SGA-n)

649-P. Properties of Ternary Alloys of Titanium, Chromium, and Zirconium Diborides. K. I. Portnoi and G. V. Samsonov. *Academy of Sciences of the USSR, Proceedings,* v. 116, no. 1-6, 1957, p. 953-955. (Translation by Consultants Bureau, Inc.)

The solubility of ZrB_2 in (Ti, Cr)B_2 is about 40 mole %, and that of (Ti, Cr)B_2 in ZrB_2 is less than 10 mole %. The range of solubility of ZrB_2 in CrB_2 increases on dissolving ZrB_2 in the double borides (Ti, Cr)B_2, with one of the components of which (TiB_2) the zirconium boride forms a continuous series of solid solutions. In the single-phase region of a solid solution of ZrB_2 in (Ti, Cr)B_2 in samples quenched from 1900°, there is a maximum in the microhardness of 3900 kg. per sq. mm. (at 20 mole % ZrB_2) and in the electrical resistance. 6 ref. (P12e; T, Cr, Zr, 14-68)

650-P.* Optical Properties of Chromium. Robert M. Hill and Charles Weaver. *Faraday Society, Transactions,* v. 54, Aug. 1958, p. 1140-1146.

Refractive index of bulk Cr was measured as 1.18-11.06 for light of wave length 5461 A. Surface film on a polished bulk metal specimen has a refractive index of 2.42 and a thickness of 50 A. 13 ref. (P17; Cr)

651-P.* Some Magnetic Properties of Dilute Ferromagnetic Alloys. Pt. 2. B. W. Lothian, A. C. Robinson and W. Sucksmith. *Philosophical Magazine,* v. 3, Sept. 1958, p. 999-1012.

Investigation of Cu-Fe, Cu-Co and Au-Ni alloys. Various magnetic properties; effect of temperature, heat treatment, cold working. 8 ref. (P16; Co, Cu, Fe, Au, Ni)

652-P.* Magnetic Susceptibility of Copper-Nickel and Silver-Palladium Alloys at Low Temperatures. E. W. Pugh and F. M. Ryan. *Physical Review,* v. 111, Aug. 15, 1958, p. 1038-1042.

Susceptibility in range 2.1° to 295° K. is nearly independent of temperature for Ag-Pd alloys, and for Cu-Ni alloys containing up to 27% Ni. (P16q, 2-73; Ag, Cu, Ni, Pd)

653-P.* Variation of Hall Coefficient of Some Non-Ferromagnetic Superlattice Alloys. Kiyoshi Yonemitsu and Takao Sato. *Physical Society of Japan, Journal,* v. 13, Sept. 1958, p. 998-1004.

The temperature dependence of Hall coefficient of five superlattice alloys of Cu_3Pd, CuZn, Ni_3Cr, Au_3Cu and Ag_3Mg was measured to find the effect of order-disorder transformation upon it. 11 ref. (P15p, 1-61, N10; Cu, Pd, Zn, Au, Ag, Ni, Cr, Mg)

654-P. "Pin-Cushion" Irradiation Tests of Uranium and Its Zirconium Alloys. S. H. Paine and F. L. Brown. Argonne National Laboratory. *U. S. Atomic Energy Commission ANL-5538,* July 1958, 41 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.25.

In an irradiation test of U^{235} and U^{235}-Zr specimens in the range 2 to 20% Zr, small pins were mounted in heat transfer blocks, or "cushions", so that surface roughening and length changes could be observed, recorded and compared for five stabilizing heat treatments up to exposure levels of approximately 1% total atom burnup. (P10d, Q-general, 2-64, 2-67; U-b, *Zr*)

655-P. Effect of Burnup of Metallic Fuel Elements Operating at Elevated Temperatures. B. R. Hayward and G. G. Bentle. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/617, 1958, 13 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Materials studied were unalloyed uranium; uranium with −2.0% Zr; with 1.5% Mo; and 3.0% Mo; and Th with 7.6% U. All these fuels are being monitored during irradiation in the Sodium Graphite Reactor Experiment (SRE). 12 ref. (P10d, Q-general, 2-62, 2-67; U, Th)

656-P. Mechanism of Irradiation-Induced Dimensional Instability of Uranium. L. L. Seigle and L. S. Castleman. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.-15/P/618, 1958, 10 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Effect of grain size on growth rate; computation of growth rates; effect of temperature; comparison of diffusional and stress relaxation mechanisms. 21 ref. (P10d, 2-67; U)

657-P. Advances in the Physical Metallurgy of Uranium and Its Alloys. H. H. Chiswik, A. E. Dwight, L. T. Lloyd, M. V. Nevitt and S. T. Zegler. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/713, 1958, 35 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Primary impetus placed on the improvement of two essential properties in the utilization of uranium as a fuel-element material—dimensional stability and corrosion resistance. Heat treatment, transformation kinetics and micrographic features of high uranium-base systems which have shown promise in this direction. 47 ref. (P10d, R-general, 2-64, 3-71, T11g, 17-57; U)

658-P. Effect of Irradiation on Fuel Material. J. H. Kittel and S. H. Paine. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/-P/1890, 1958, 20 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Although unalloyed U with suitable metallurgical treatment can be subjected to burnups on the order of 2 at.%, damage is severe. The deleterious changes which occur at moderate irradiation temperatures are principally because of surface roughening and anisotropic growth.

(*) Articles Available Through Photocopy Service; See Coupon, p. 91.

Certain alloying additions greatly refine the grain size in U, thus eliminating surface roughening. 12 ref. (P10d, M27c, 2-67; U)

659-P.* (Russian.) **Electrical Resistance of Iron, Nickel and Nickel-Copper Alloys at Low Temperatures.** E. I. Kondorsky, O. S. Galkina and L. A. Chernikova. *Zhurnal Eksperimental'noj i Teoreticheskoj Fiziki,* v. 34, May 1958, p. 1070-1076.

Measurements were made in the temperature range 2-78° K. It is believed that the resistance of ferromagnetic metals at low temperatures is related to scattering of electrons or inhomogeneities of the magnetic moment of the lattice.
(P15g, 2-63; Fe, Ni, *Cu*)

660-P.* (Russian.) **Thermal Properties of Superconductors. Pt. 2.** N. V. Zavaritsky. *Zhurnal Eksperimental'noj i Teoreticheskoj Fiziki,* v. 34, May 1958, p. 1116-1124.

Specific heat, thermal and temperature conductivity of Al and Zn measured between 1.5 and 0.15° K. by the temperature wave method. Results compared with measurement of specific heat of other superconductors and with results of microscopic theory of superconductivity. 22 ref. (P11, P12r; Al, Zn)

661-P.* (Russian.) **Surface Resistance of Superconducting Cadmium.** M. S. Khaikin. *Zhurnal Eksperimental'noj i Teoreticheskoj Fiziki,* v. 34, June 1958, p. 1389-1397.

Apparatus which can be used to measure the surface resistance of a metal at a wave length of 3.2 cm. in the super-low-temperature region of about 0.1° K. Total surface resistance of a Cd single crystal is measured in the temperature interval between 0.1 and 0.6° K. Results are analyzed and penetration depth of electromagnetic field in superconducting Cd determined. 17 ref. (P15g; Cd)

662-P.* (Russian.) **Anodic Activation of Chromium and Chromium Steels.** E. I. Antonovskaya and A. M. Sukhotin. *Zhurnal Fizicheskoi Khimii,* v. 32, Aug. 1958, p. 1842-1845.

Anodic potential of Cr diminishes when the pH number of electrolyte increases. Over the range of high anodic potentials, the ratio of Cr and Fe in solution is different from the ratio of these elements as constituents of the steel. Ratio of elements in solution given for steels 1Kh13 and 1Kh25 at different anodic potentials. 5 ref. (P15; AY, *Cr*)

663-P.* (Russian.) **In What Form Is Silicon Present in Liquid Iron?** A. A. Vertman and A. M. Samarin. *Doklady Akademii Nauk SSSR,* v. 120, no. 2, 1958, p. 309-310.

The magnetic susceptibility of melts of the system Fe-Si was measured for 0 to 60% Si and reached a minimum with an assumed content of 34% FeSi. Magnetic susceptibility thought to decrease with increased amount of Si compounds, and to increase with increased amount of free Si atoms present. 11 ref.
(P16; Fe, *Si*, 14-60)

664-P.* (Russian.) **Spin-Lattice Relaxation and Nuclear Magnetic Resonance of Rare Earth Salts.** K. A. Valiev. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 193-202.

Possibility of experimental study of nuclear magnetic resonance of nuclei or paramagnetic ions of rare earth compounds. Experiments conducted at 1.2° K. with Si specimens containing additions of paramagnetic P atoms. Experimental observation of magnetic resonance depends mainly on width of absorption line. In magneto-diluted crystals of rare earth salt ions, the width of the line is determined by the spin-lattice interaction of the ions. 11 ref. (P16f, M26r; EG-g, P, Si)

665-P.* (Russian.) **Electric Conductivity of Ferromagnetic Metals at Low Temperatures. Pt. 2.** E. A. Turov. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 203-213.

Phenomenological observations of interaction of electron conductivity and ferromagnets. Detailed study of electrical resistivity at low temperatures; new experimental data. Solution of corresponding kinetic equation by means of its reduction to equation of diffusion of phase states on Fermi surfaces in area of quasi-impulses. Investigation of additional electrical resistivity in ferromagnetic metals related to the diffusion of electrons in ferromagnets. 18 ref. (P15g, N1c, 2-63; SGA-n)

666-P.* (Russian.) **Electric Conductivity of Antiferromagnetic Metals.** Yu. P. Irkhin. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 214-221.

Influence of antiferromagnetic ordering on electric conductivity, analogous to the theory of binary ordered alloys. Main results are contingent on the possibility of splitting the conductance bands by two subbands divided by split energy intervals. Actual experimental data confirm qualitatively the theoretical assumptions. The peculiarities of electroconductivity in antiferromagnetic ordering are also to be observed in semiconductors. 22 ref. (P15g, P16p)

667-P.* (Russian.) **Magnetic Grain Structure in Magnetic Poles of Thin Iron Surfaces Obtained by Electrolysis.** N. V. Kotel'nkov. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 222-228.

The internal stress of ferromagnetic deposits obtained by electrolysis can alter the grain structure. The grain structure of deposited metal is influenced by lining material, machining of the lining surface before deposition, structure of the deposited metal and the magnetic pole. In its effect on grain structure there is a maximum polarity (a critical point). If it is exceeded the grain structure declines. Coating of the magnetic pole in process of deposition on iron improves quality of coating and strengthens its adhesion to the lining (undercoating). 9 ref.
(P16, 3-68; Fe, SGA-n)

668-P.* (Russian.) **Magnetic Properties of Magneto-Anisotropic Objects of Ferromagnetic Powder. Pt. 3.** G. S. Kandaurova, Ya. S. Shur and E. V. Shtol'ts. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 229-236.

Study of anisotropy of magnetized curves and hysteresis of lattice structure in objects of magnetic grain structure. Objects were in form of disks made from Co powder and Mn-Bi. Results showed characteristics of magnetic structures of tiny particles of Co and Mn-Bi alloys (size 1-100 μ). 8 ref. (P16, M26, 3-72; Bi, Co, Mn, SGA-n, 6-68)

669-P.* (Russian.) **Study of Iron-Nickel and Iron-Cobalt Alloys With Frequency Band of 10^5 to 10^7 Cycles.** E. I. Kondarskii and L. G. Smirnova. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 237-246.

Aim was to overcome lack of systematic data on penetrability of magnetic sheet steel. Materials investigated with varying values of constant anisotropy and magnetostriction: Mo-permaloy, Armco iron, and Fe-Co alloys (containing 20, 36, 60 and 72% Co). 10 ref.
(P16q, P16b, 3-72; ST, Co, Fe-B, Mo, Ni, SGA-n, 4-53)

670-P.* (Russian.) **Influence of Decomposition of Super-Saturated Hard Metals on the Hall Effect.** A. V. Cheremushkina. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 268-271.

Influence of diffusion hardening on Hall effect, specific electric resistivity, magnetized saturation and coefficient of force of Fe-W alloys (3.7 to 17.3% W). Conclusions confirm earlier investigations showing existence of a critical concentration as to optimum possible solubility of W in Fe. Exceeding that limit produces no changes in electric resistivity. 7 ref.
(P15p, P15g, P16, 2-60, 2-64; Fe, W)

671-P.* (Russian.) **Influence of Nonuniformity in Steel on Electrical Resistivity During Phase Changes.** N. M. Rodizin. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 315-320.

Heating by an electric current directly without intermediate means makes it possible to heat object with great speed resulting in many practical advantages. It is reflected in the phase changes and in its basic characteristics. It results in an uneven distribution of heat to the various microparticles having varying electrical resistivity. Distribution of heat energy by electric heating of steel depends on form and distribution of microparticles and different electrical resistance.
(P15g, N8, 2-61; ST)

672-P. Magnetic Properties of Stainless Steels. W. S. Eberly. *Electrical Manufacturing,* v. 62, Sept. 1958, p. 91-94, 302, 303.

Normal fabricating processes and minor variations in chemical composition can cause normally nonmagnetic (austenitic) steels to become magnetic or, conversely, can depreciate the magnetic qualities of ferritic and martensitic alloys.
(P16; SS)

673-P. Single Crystal Iron Whiskers Adapted to the Basic Study of Magnetic Domains. Gifford G. Scott and Robert V. Coleman. *Engineering Journal,* v. 5, July-Aug-Sept. 1958, p. 34-37.

6 ref. (P16c; Fe, 14-61)

674-P. Effect of Alloying on the Critical Mass of a Plutonium Spherical Fast Reactor. James T. Weber, Mary Repar Kline and Leah K. Johnson. *Nuclear Science and Engineering,* v. 4, Sept. 1958, p. 341-353.

Effect of alloying on the amount of Pu required to form a critical mass of each alloy has been expressed in terms of an inventory requirement ratio. This quantity was obtained for 27 potential alloying elements at three compositional levels. 7 ref. (P18, 2-60, T11g; Pu-b)

675-P. Intrinsic Optical Absorption in Single-Crystal Silicon Carbide. Hekrert R. Philipp. *Physical Review,* v. 111, July 15, 1958, p. 440-441.
(P17c; Si, *C*, 14-61)

676-P. Electrical Properties of Mercury Telluride. R. O. Carlson. *Physi-*

cal Review, v. 111, July 15, 1958, p. 476-478.

Measurements of resistivity and Hall effect extended to liquid hydrogen temperature reveal a marked magneto-Hall effect. The Hall coefficient changes sign at temperatures as low as 20° K. Some measurements of thermo-electric power and thermal conductivity are also given. (P15g; Hg, Te, 14-68)

677-P. Influence of Electron Interactions on Metallic Properties. John G. Fletcher and David C. Larson. *Physical Review*, v. 111, July 15, 1958, p. 455-462.

Influence on one-electron energy in metals calculated. (P15)

678-P. Variation With Frequency of the Resistance of Superconducting Tin and Indium. M. D. Sturge. *Royal Society, Proceedings*, v. 246, Aug. 26, 1958, p. 570-581.

22 ref. (P15g; In, Sn)

679-P. Physics of Natural Uranium Lattices in Heavy Water. G. Dessauer. Second United Nations Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/590, 1958. 43 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Physics parameters of more than 250 different lattices were measured. Amount of U at each lattice point in the lattice spacing and the amount and distribution of coolant within each fuel assembly varied over a wide range. 31 ref. (P18, T11g; U)

680-P. Resonance Capture in Uranium and Thorium Lumps. B. I. Spinrad, J. Chernick and N. Corngold. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1847, 1958, 38 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

From logical inference and detailed sample calculations a form for representation of effective resonance integrals is presented. Qualitative formulations are also derived whereby resonance integrals can be computed on a line-by-line basis for mixtures, clusters and lumps. 25 ref. (P18m; U, Th)

681-P. Thermomagnetic Nernst Effect in Iron-Nickel Alloys. E. P. Svirina and R. P. Ivanova. *Fizika Metallov i Metallovedenie*, v. 3, no. 3, 1956, p. 444-448. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4250.)

(P15; Fe, Ni)

682-P. Enthalpy of Formation of Strontium Arsenide Sr_3As_2. S. M. Ariya, Kan Kho-in, Yu. Barabanel and G. M. Loginov. *Journal of General Chemistry of the USSR*, v. 27, no. 7, 1957, p. 1812-1814. (Translation by Consultants Bureau, Inc.)

5 ref. (P12r; Bi, K, Sb, Sr, As)

683-P. Mechanism of Metal Electrodeposition From Solutions of Simple and Complex Salts. A. I. Levin. *Journal of General Chemistry of the USSR*, v. 27, no. 7, 1957, p. 1815-1820. (Translation by Consultants Bureau, Inc.)

23 ref. (P15, L17, L18, C23, U2j)

684-P. Electron Reactions in Stainless Steels Containing Sigma Phase. I. Bertetti. *Metallurgia Italiana*, no. 7, 1956, p. 324-326. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB153.)

(P15; SS)

685-P. Delayed Electron Emission of Metals. K. Seeger. *Zeitschrift für Physik*, v. 141, 1955, p. 221-236. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-25G8G.)

(P15k)

686-P. Solubility of Thorium in Liquid Zinc. M. V. Smirnov, N. G. Ilyushchenko, S. P. Detkov and L. E. Ivanovskii. *Zhurnal Fizicheskoi Khimii*, v. 31, 1957, p. 1013-1018. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4215.)

Previously abstracted from original. See item 357-P, 1957. (P12e; Zn, Th)

687-P. (German.) **Structural Changes of Gallium Telluride (Ga_2Te_3) Caused by Cu Additions.** Gunter Harbeke and Gunter Lautz. *Naturwissenschaften*, v. 45, June 1958, p. 283-284.

Different electric and absorption properties with Cu additions between 8.10^{-6} and 10^{-5} at.%, thought to be caused by structural transformations. (P15, P17; Cu, Ga, Te)

688-P. (Russian.) **Theory of Surface Conductivity of Metals.** C. V. Vonsovskii and M. C. Cvirskii. *Doklady Akademii Nauk SSSR*, v. 120, no. 2, 1958. p. 269-272.

8 ref. (P15g)

689-P. Kinetics of the Oxidation and Nitridation of Silicon at High Temperatures. J. W. Evans and S. K. Chatterji. *Journal of Physical Chemistry*, v. 62, Sept. 1958, p. 1064-1067.

Kinetic behavior of Si in oxygen and CO_2 in nitrogen and in argon containing a trace of nitrogen at 1200-1400°. 7 ref. (P12, R2; Si, 2-62)

Mechanical Properties and Tests

1204-Q.* The Change of Fatigue Limit on Chromium or Nickel Plating With Particular Reference to the Strength of the Steel Base. C. Williams and R. A. F. Hammond. *Institute of Metal Finishing. Transactions*, v. 34, 1956-1957, p. 317-353.

A variety of steels of different compositions and ultimate tensile strengths were plated and, for unbaked deposits, a linear relationship between the percentage change in fatigue strength on Cr plating and the fatigue limit of the steel substrate was established. It is thus possible to predict the percentage change in fatigue strength for deposits of known internal stress from the fatigue limit, the ultimate tensile strength, or hardness of the steel, irrespective of its composition; a simple formula is derived. 26 ref. (Q7a; ST, *Cr, Ni*, 8-12)

1205-Q.* Self-Restraint in Steel in Relation to Brittle Fracture. S. A. Main. *Iron and Steel*, v. 31, Oct. 1958, p. 479-484, 498.

Self restraint is effected in two, or possibly three, different ways. It can act in a purely static manner. Under dynamic conditions it is exerted additionally by the inertia of the metal and possibly to some extent through viscosity. The reactionary effects of self-restraint are illustrated by reference to the more ordinary forms of mechanical test. 15 ref. (Q26; ST)

1206-Q.* Elastic Constants of Silver and Gold. J. R. Neighbours and G. A. Alers. *Physical Review*, v. 111, Aug. 1, 1958, p. 707-712.

The three elastic constants C_{44}, $\frac{1}{2}(C_{11} - C_{12})$, and $\frac{1}{2}(C_{11} + C_{12} + 2C_{44})$ have been directly measured in the temperature range between 4.2 and 300° K. The various contributions to the values of the 0° K. constants are analyzed in terms of a simple model which quite successfully describes Cu. It is concluded that such a model is unsatisfactory when applied to the heavier noble metals because these appear to have large noncentral forces contributing to their constants. Combined with pressure data, the present results show the elastic constants to be explicit functions of temperature. The Debye characteristic temperatures calculated from the 0° K. elastic constants are shown to be in substantial agreement with the results from calorimetry. 19 ref. (Q21e; Ag, Au)

1207-Q.* Pressure Derivatives of the Elastic Constants of Copper, Silver and Gold to 10,000 Bars. W. B. Daniels and Charles S. Smith. *Physical Review*, v. 111, Aug. 1, 1958, p. 713-721.

Measured over the pressure range from 0 to 10,000 bars, using a modified ultrasonic pulse-echo method. Means are devised to measure the change of elastic constant with pressure as directly as possible. The data for each metal, of the three elastic constants and their pressure derivatives, are interpreted in terms of conventional theory. The analysis indicates that these must be noncentral, many-body interactions to account for the shear constants and especially their pressure derivatives. The many-body character of the interactions is of rapidly increasing importance in the sequence Cu, Ag and Au. 31 ref. (Q21, 3-74; Cu, Ag, Au)

1208-Q. Mechanical Properties of Uranium-Molybdenum Alloys. M. B. Waldron, R. C. Burnett and S. F. Pugh. *United Kingdom Atomic Energy Authority*, AERE M/R 2554, 1958, 33 p.

Tensile properties and hardness of U-Mo alloys in the composition range 0-14% Mo studied at room and elevated temperatures. At lower concentrations, the breakdown of the gamma solid solution to unstable microstructures leads to pronounced aging effects. Above 5.5% Mo the gamma solid solution is retained to room temperature and shows enhanced properties up to 800° C. 11 ref. (Q27a, Q29n; U, *Mo*)

1209-Q. Some Effects of Cold Rolling, Annealing and Aging on the Mechanical Properties of Zircaloy-3B. D. E. Johnson. Hanford Atomic Products Operation. *U. S. Atomic Energy Commission, HW-53621*, Nov. 15, 1958, 58 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.25.

Tensile properties of Zircaloy-3B as a function of the cold worked condition of the material between the limits of 0 and 80% cold work. Tensile properties were also determined for test temperatures of −50, 22, 100, 200 and 300° C. Effect of short-time and long-time annealing on the tensile properties and of alpha-phase annealing treatments on microstructure and me-

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

chanical properties of a simulated Zircaloy-3B weld structure.
(Q27a, 2-64, 2-65, 3-68; Zr-b)

1210-Q. The Influence of Composition Upon the 1500° F. Creep-Rupture Strength and Microstructure of Molybdenum-Chromium-Iron-Nickel Base Alloys. T. K. Roche. Oak Ridge National Laboratory. *U. S. Atomic Energy Commission, ORNL-2524*, July 9, 1958, 110 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $2.75.

Influence of composition variation upon the 1500° F. creep-rupture strength and microstructure. Alloys contained 10 to 20 Mo, 5 to 10 Cr, 4 to 10 Fe, 0.5 Al, 0.5 Mn, 0.6 C, balance Ni. Composition of the individual alloys was varied systematically with the intent that, by direct comparison, the effect of an element upon strength could be determined. 7 ref.
(Q3m, M27, 2-60; AY)

1211-Q.* The Effect of Size on the Looseness of Wear Fragments. Ernest Rabinowicz. *Wear*, v. 2, Aug. 1958, p. 4-8.

Whether a fragment transferred during sliding comes off as a loose wear particle depends on whether its elastic energy exceeds the surface energy at its point of attachment. Calculations show that, for an equiaxed fragment, there is a critical size such that smaller fragments remain adherent while larger fragments come off in loose form. Experimental support for this critical size concept is cited. 8 ref. (Q9)

1212-Q.* Wear of Carbide Tools and Surface Finish Generated in Finish Turning of Steel. Vladimir Solaja. *Wear*, v. 2, Aug. 1958, p. 40-58.

Concentrated tool wear, localized upon the boundaries of the areas of contact between rake face and chip and between the clearance face and workpiece, is a specific phenomenon encountered in turning of steel. It causes the surface finish to deteriorate rapidly, and in addition it can be supposed to be associated with the dimensional accuracy and the condition of surface layer of the workpiece. A number of variables including the grade of carbide tips used, workpiece material, rake and clearance angle of tools, feeds and speeds, were studied. 11 ref.
(Q9, G17; ST, 6-69)

1213-Q. (Czech.) **Plastic Stresses in Steels.** J. Nemec. *Hutnické Listy*, v. 12, no. 4, 1957, p. 315-324.

A solution is obtained to the problem of calculating the stress condition of nonhomogeneous material in the plastic range. Relationships between statistical strength of ductile steels and the fundamental physical parameters of the deformation of ferrite. Comparison of mathematical principles of the plastic state according to the theory of instantaneous stress condition and the theory of propagation of plastic deformation. Both theories are compared with experimental findings.
(Q24; ST)

1214-Q. (Chinese.) **Nature of Internal Friction Peaks Due to Stress-Induced Diffusion of Carbon in Alloy Steels With a Face-Centered Cubic Lattice.** Ke Tin-Sui, Tsian' Chzhi-Tsian and Uli Siuebao. *Acta Physica Sinica*, v. 12, no. 6, 1956, p. 607-621.

Internal friction peaks due to diffusion through an applied stress were observed in four types of Mn steel with a face-centered cubic lattice, containing 18.5, 25.4, 36% Mn and 9.5% Mn, 8% Ni and 3% Cr respectively. The optimum internal friction was observed at about 250° C. and an oscillation frequency of about 2 cycles per sec. The height of the internal friction peak varies in direct proportion to the C content in solid solution.
(Q22, N1; AY, *Mn*)

1215-Q. (Chinese.) **Internal Friction Peak Due to Stress-Induced Diffusion of Carbon in Martensite of Low-Carbon Steel.** Ke Tin-Sui, Ma In-Lian, Uli Siuebao. *Acta Physica Sinica*, v. 13, no. 1, 1957, p. 69-77.

Using torsional pendulum methods, at a temperature of 155° C. and an oscillation frequency of 2 cycles per sec., a maximum of internal friction was observed; conditions of occurrence were martensitic structure of the specimen and C and Ni impurities. An analogous peak was observed in Cr and Cr-Ni steels. In steel containing 29.7% Ni, the size of the internal friction maximum is directly proportional to carbon content.
(Q22, N1; CN-g, AY)

1216-Q.* (French.) **Influence of Duration of Charging and of Exposure to Ordinary Atmosphere on Hydrogen Brittleness in Steels.** J. Plusquellec, P. Azou and P. Bastien. *Comptes Rendus*, v. 246, June 23, 1958, p. 3454-3457.

Specimens of extra mild steel (0.08% carbon) from which all residual H had been removed were subjected to H charging for periods up to 100 hr. and exposed to ordinary air for different times before tensile testing. General capacity for deformation was lowered by presence of H, with reduction of area decreasing when duration of charging was increased. Fragility decreased in proportion to increased duration of exposure to air before testing. 4 ref. (Q26s; CN)

1217-Q. (Russian.) **Study of the Internal Friction in Gamma and Alpha-Phases of High-Chromium Steels.** Yu. V. Pigusov. *Doklady Akademii Nauk SSSR*, v. 112, no. 4, 1957, p. 636-639.

Specially melted steel 105 Kh 12 containing 1.05% C, 11.9% Cr, 0.012% N investigated. On curves correlating temperature and internal friction of specimens quenched from 800-1020° C. into water, a maximum value of internal friction appears about 210° C. at a frequency of 1.4 cycles per sec. Maximum value of internal friction about 210° C. is caused by interatomic reactions of the carbon with lattice defects, the latter being initiated by elastic stresses in the martensite lattice. (Q22; AY, *Cr*)

1218-Q.* (Russian.) **Effect of Forced Slipping at the End of Plastic Compression of Metals.** K. V. Savitskii and M. P. Zagrebennikova. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 113-119.

The effect of forced rotation of one of the supporting plates of a press investigated while the metal sample was being compressed. Results were plotted to compare with those obtained by compressing metal in the usual manner. The effect of speed of slipping on one side and alternate rotation of plates were examined. 5 ref. (Q28, Q1)

1219-Q. (Russian.) **Microstresses in Hardened Steel on Friction.** F. Ya. Iokheles and V. I. Startsev. *Metallovedenie i Obrabotka Metallov*, no. 3, 1957, p. 15-22.

Changes of microstresses in the crystal lattice, the dimensions of zones of coherent diffraction, as well as variation in microhardness and phase composition in thin surface layers in carburized, quenched and tempered steel 18 KhNWA investigated by X-ray in the processes of friction and wear. A series of tests consisted of several loading periods of 0.5×10^6 cycles each. X-ray diagrams were taken from six positions of the profile of the disk corresponding to different slip rates. The value of residual stresses and grain size determined from the form of the diffraction lines by means of harmonic analyses.
(Q9, 3-66; ST)

1220-Q. (Russian.) **Temper Brittleness of the Second Type-Thermal Aging of Steel.** K. M. Pogodina-Alekseeva. *Metallovedenie i Obrabotka Metallov*, no. 3, 1957, p. 36-40.

Investigation of 45 G2, 30 KhGSA, 15 GS, and 12 KhNZA steels after conventional heat treatment. Embrittlement was accomplished by an anneal at 600-660° C. followed by slow furnace cool, or by repeatedly annealing soft tempered nonbrittle specimens to 550° C. with subsequent water cool. Temper brittleness of the second type is caused by the processes of dissolution of excess phases in ferrite, of concentration of the constituents in the grain boundary layers, and of their subsequent precipitation in form of individual phases with different degrees of dispersion. Analogous processes occur on thermal (precipitation) hardening of steel.
(Q26s, N7; AY)

1221-Q. (Russian.) **Correlation Between Temperature and Internal Friction of Some Pure Metals.** V. S. Postnikov. *Uchenye Zapiski (Kemerovskii Gossudarstvenny Pedagogicheskii Institut)*, Series 1, 1956, p. 191-204.

Changes of internal friction as related to temperature investigated on Al, Ti, Co, Ni, Cu, Mo and W after annealing at 800° C. The ratio of the logarithmic damping decrement of free torsional oscillations to the number 11 was adopted as a measure of internal friction. It is experimentally demonstrated that the maximum of the internal friction (or the change of slope) is located in the range of recrystallization of a metal. Location depends on the height of the prior plastic deformation. Increase in plastic deformation leads to a displacement of the maximum to lower temperatures.
(Q22, 2-61; Al-a, Ti-a, Co-a, Ni-a, Cu-a, Mo-a, W-a)

1222-Q.* (Spanish.) **Silicon-Bearing Cast Irons.** Mario Pujol. *Instituto del Hierro y del Acero*, v. 11, Apr-June 1958, p. 104-117.

Corrosion resistance and mechanical properties of spheroidal graphite iron containing 5.5% Si were good at temperatures up to 850° C. For higher temperatures, Si content of 6.5% gave satisfactory results. In lamellar iron with equivalent Si contents corrosion resistance was approximately the same, but mechanical properties were considerably inferior. 4 ref.
(Q-general, R-general, 2-60, 2-61; CI-q, *Si*)

1223-Q.* (Spanish.) **Contribution to the Study of the Pearlitic Matrix of Gray Cast Iron.** Jose Navarro and Luis Froufe. *Instituto del Hierro y del Acero*, v. 11, Apr-June 1958, p. 118-127.

An equation is deduced in which Brinell hardness of iron appears as function of hardness of matrix and

notch factor of contained graphite. Statistical measurements of microhardness of pearlite grains of test bars gave virtually constant values. However, hardness of iron itself varied greatly. Calculation of tensile strength of pearlitic matrices, based on previous hardness measurements and on study of appropriate parameters, revealed no appreciable variation except for low coefficients of saturation. From comparison of hardness values and tensile strength of iron and its respective matrices, over-riding importance of effect of graphite in decreasing strength and hardness of unalloyed cast irons is deduced. 11 ref. (Q29n, Q27a; CI-n)

1224-Q.* (Spanish.) **Microhardness.** Francisco Munoz del Corral and Luis Alonso. *Instituto del Hierro y del Acero*, v. 11, Apr-June 1958, p. 128-137.

Specimens of 99.9% Cu and hardened steel were prepared for hardness testing by various combinations of machining and metallographic techniques. General conclusions were drawn as follows: A soft metal becomes brittle and exhibits high microhardness values under low loads as a result of alterations to surface layer. (However, annealed Cu specimens reduced 40 to 60% by cold rolling gave lower hardness values under low loads.) High hardness values can be corrected to correspond largely to hardness of nucleus by annealing in argon atmosphere and extended electrolytic polishing. A hard metal undergoes frictional heating and softening during machining and mechanical polishing, and gives lower hardness readings under small loads than under heavy loads. In this case, removal of softened surface layer by careful grinding and elimination of tendency to soften by tempering make it possible to obtain reasonably constant hardness values regardless of load. 7 ref.
(Q29q, Cu, ST)

1225-Q.* **Cast Alloy Resist Heat.** *Iron Age*, v. 182, Oct. 16, 1958, p. 192-194.

Some cast alloys will stand up well at 1500° F., others will operate satisfactorily up to 2000° F. Choose the alloy in terms of both temperature and operating conditions. Table of the chemistry of cast heat resistant alloys; charts showing how elevated temperatures affect heat resistant casting properties.
(Q-general, 2-62; 17-57; SGA-h, 5-60)

1226-Q.* **Austenitic Manganese Steels for Abrasive Wear.** *Iron Age*, v. 182, Oct. 16, 1958, p. 196-197.

Tough, ductile and nonmagnetic austenitic Mn steels can withstand both severe wear and heavy impact. Tables show mechanical, fatigue and physical properties.
(Q9, Q general; AY, *Mn*)

1227-Q.* **Mechanism of Beneficial Effects of Boron and Zirconium on Creep-Rupture Properties of a Complex Heat-Resistant Alloy.** R. F. Decker and J. W. Freeman. *National Advisory Committee for Aeronautics*, TN 4286, Aug. 1958, 54 p.

Mechanism by which the addition of B and Zr improves the creep-rupture properties of an alloy of 55% Ni, 20% Cr, 15% Co, 4% Mo, 3% Ti and 3% Al was investigated at 1600° F. Materials with varying B and Zr content were exposed to creep conditions, then the microstructures were analyzed by optical and electron microscopy, electron diffraction, microfractography and hardness measurements. **Interrupted** creep tests that allowed comparisons of materials after equivalent creep exposures were particularly useful. Creep-rupture properties were improved because B and Zr have a pronounced stabilizing effect on the grain boundaries of the alloy. 44 ref.
(Q3m, 2-60; Ni-b, SGA-h)

1228-Q. **Effects of Irradiation on Some Uranium-Plutonium Alloys.** J. H. Kittel and L. R. Kelman. Argonne National Laboratory. *U. S. Atomic Energy Commission ANL-5706*, 23 p. June 1958. (Available from U. S. Office of Technical Services, Washington 25, D. C.) 75c.

Cast alloys of uranium with 3.7, 6.6 and 13.0% Pu, and extruded alloys with 9.5, 14.1 and 18.7% Pu were investigated. Cast specimens developed severe surface roughening as a result of the irradiation they received, presumably because of excessively large grain sizes present before irradiation. As-extruded alloy specimens maintained good surface smoothness under irradiation but showed elongations which were dependent on Pu content. 11 ref.
(Q9, Q27, S15, 2-67; U, Pu)

1229-Q.* **Dependence of the Relative Heat Resistance on Composition in the System Cu-Ni-Si.** I. I. Novikov and L. I. Dautova. *Academy of Sciences of the USSR, Proceedings*, v. 115, (1957), p. 689-693. (Translation by Consultants Bureau Inc.)

Effect of various compositions on heat resistance (based on hardness of alloy at 700° C.), which rises to a maximum in heterogeneous regions of the phase diagrams. 13 ref. (Q-general, 2-52; Cu, Ni, Si)

1230-Q.* (Czech.) **Stresses in the Unit Metal-Enamel. Pt. 1.** Jaroslav Chmela. *Korose a Ochrana Materialu*, v. 2, no. 3-4, 1958, p. 38-42.

Stresses effective in cooling after enameling as well as those caused by raised or lowered service temperature. Stresses thought to be dependent on the difference between the expansion coefficients of enamel and metal in temperature changes, thickness of enamel coating, shape of the enameled part, properties of the prime layer of enamel and adhesive strength between enamel and metal.
(Q25k, L27)

1231-Q.* (Dutch.) **Imoprtant Factors in Bonding.** C. Jouwersma. *Metalen*, v. 13, Aug. 30, 1958, p. 284-289.

Study on the build-up of internal stresses during bonding and on external stresses effective, influenced by wetting properties, limits of plastic flow, moduli of elasticity, geometry of the bond. 10 ref. (Q25, K12)

1232-Q.* (Finnish.) **Brittle Fracture of Clean Mild Structural Steel.** J. E. Holmstrom. *Hitsaustekniikka*, no. 2, 1957, p. 29-34, 36, 38, 40, 50.

Effects of temperature, loading rate, thickness of material and heat treatment on the equicohesive temperature. Welding methods have been devised which keep the possibility of brittle failure to a minimum. Welding defects are classified according to importance, in the following order: cracks, penetration defects, reinforcements, edge undercuts, slag lines. It is undesirable to use and weld Thomas steel at temperatures below 0° C., since brittle failure is possible.
(Q26s; CN)

1233-Q.* (French.) **Mechanical Properties of the Light Alloys at Low, Medium and High Temperatures.** M. Tournaire. *Technique et Science Aeronautiques*, no. 6, 1957, p. 273-283.

Although physical properties of light alloys are essentially stable between −75° and +75° C. for long periods of time, at temperatures between 150 and 350° C. these properties change rapidly and precisely according to chemical composition of the alloy as a function of time and temperatures. Tables show tensile properties, fatigue and elastic properties for various compositions at different temperatures.
(Q-general, 2-61; EG-a39, Al, Mg)

1234-Q.* (German.) **Structure of Lead Alloys and Creep Strength.** W. Hofman and H. V. Malotki. *Metall*, v. 12, Aug. 1958, p. 695-697.

Experiments on the correlations between structure and creep strength with Sn, Cd, In, Sb, Ti and Cu alloys showed that at a certain grain size the creep rate was a minimum. Rate decreases with increased Cu, Sn. Lead alloys of 0.09 at. % Cd or In and Pb-Sb-As alloys showed least creep speed increase in relation to recrystallization tendency. Recrystallization structures with large differences in grain size showed best creep properties. 18 ref. (Q3, 3-71; Pb-b)

1235-Q.* (Russian.) **Brittleness of Chromium.** S. T. Kishkin and I. O. Panasyuk. *Doklady Akademii Nauk SSSR*, v. 113, no. 6, 1957, p. 1263-1264.

Mechanical properties of Cr as a function of temperature. Low resistance to rupture at room temperature is connected with local distortions in the crystal lattice due to impurities which form interstitial solid solutions with Cr (N, O, H, C and B). Depending on the gas content, the threshold cold brittle temperature for Cr varies in the range 200-800° C. The biggest increase in brittleness of Cr is caused by dissolved N, which can diffuse from gaseous media into Cr on prolonged holding in the range from 700° C. upwards.
(Q26s, 2-61, 3-69; Cr)

1236-Q.* (Russian.) **Static and Cyclic Strength of Metallo-Ceramic Hard Alloys Consisting of Tungsten Carbide and Cobalt.** G. S. Kreymer, A. I. Baranov and O. S. Safonova. *Fizika Metallov i Metallovedenie*, v. 5, 1957, p. 361-364.

Cyclic strength of cobalt-tungsten carbide systems studied as a function of thickness of Co interlayers and as function of plasticity. Tests consisted of bending rotating specimens which were fixed on one side. **Tests** were based on five-million loading cycles. Results confirm view that the reduction in plasticity of the Co interlayers with a decrease in thickness leads to a decrease in the strength and thus also to a decrease in the strength of the material as a whole.
(Q27a; W, Co, 6-69, 6-70)

1237-Q. (Russian.) **Internal Friction in Recrystallized Aluminum-Magnesium Alloys.** A. V. Grin'. *Fizika Metallov i Metallovedenie*, v. 4, no. 2, 1957, p. 383-384.

Study by the torsional vibration method of the relationship between temperature and internal friction in recrystallized alpha solid solution of Mg in Al for 0.01% Mg, 0.05, 0.5, 1 and 2%. Reduction in the height of the maximum internal friction due to grain boundaries, which occurs when the grain size is increased, together with the effect of

Mg on the stress relaxation processes, are explained satisfactorily by the theory of intercrystalline internal adsorption.
(Q22, 2-60; Al-b, *Mg*)

1238-Q. (Russian.) **Internal Friction of Temper-(Hot)-Brittle Steel.** E. I. Kvashnina and V. I. Prosvirin. *Izvestiia Akademii Nauk USSR, Otdelenie Tekhnicheskikh Nauk,* no. 1, 1955, p. 157-159.

Measurements of internal friction of Type-35KHG steel in the ductile and temper brittle conditions. Internal friction was measured by the relative damping of free torsional oscillations in stress cycles of 8, 12 and 14 kg. per sq. mm. Effects of prolonged heating at 500° C., high-temperature heating of the embrittled steel and time of heating for high-temperature annealing followed by heating at 500° C. Data were obtained for comparison on the effect of prolonged heating at 500° C. on VT Mo-steel, in which temper brittleness does not exist. Internal friction of steel 35KHG increases due to the ferrite becoming denuded of carbon. (Q22, Q26s; AY)

1239-Q.* (Russian.) **Creep of Austenitic Steel Under Complex Stress.** I. A. Oding and G. A. Tulyakov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 1, Jan. 1958, p. 3-10.

Tests were made on thin-walled metallic tubes with 0.09% Cr, 0.78% Mn. 0.36% Si, 0.010% S, 0.018% P, 10.68% Ni and 0.47% Ti at 600° C. (with preliminary heat treatment at 1100° C. and cooled in air) to determine creep properties under torsion stress. Experiments did not confirm the theory of directional coincidence of principal tensions and principal axes in deformation under prolonged stress. Observations of creep under complex stress revealed the redistribution of the main creep velocities with the alignment of the creep velocities in the main directions v_1 and v_2 and the creep velocity in a third direction v_3 converging to zero. (Q3; AY)

1240-Q.* (Russian.) **Regularities in the Dependence of Microhardness of Solid Solution Crystals on the Composition of Alloys in Three-Component Systems.** N. N. Glagoleva and V. M. Glazov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 1, Jan. 1958, p. 130-134.

Dependence of microhardness on composition of the solid solution in the systems Al-Mg, Al-Si, Al-Mg-Si, Al-Cu, Al-Cu-Mg, Cu-Zn, Cu-Sn and Cu-Zn-Sn were studied on cross sections with 1:1 weight ratio between alloyed components. The relation of microhardness to composition in transitions from one phase to two-phase system was also studied. Cross sections and the composition of alloys are given at 550° for Al-Mg-Sn and at 500° for Cu-Zn-Sn. (Q29a, 2-60, M24; Al-b, Cu-b)

1241-Q. (Russian.) **Effect of Shot Peening on the Cavitation Resistance of Metals in Magnetostrictional Vibration Tests.** L. A. Glikman and Yu. E. Zobachev. *Metallovedenie i Obrabotka Metallov,* no. 5, 1957, p. 38-41.

Heat treated specimens of plain (0.4 and 0.55% C) steel and steel 1Kh18N9T and of cast brass LMts-Zh55-3-1 were shot-peened and ground. Effect of peening on cavitation resistance was investigated on a magnetostrictional vibrator in sea-water, at 800 cycles per sec. and amplitudes of 70, 50 and 25. Criterion of cavitation resistance was the loss in weight of specimens after 3-hr. test. It was found that shot peening of the surface and the amplitude of the vibrations did not substantially affect cavitation resistance. (Q9, R2m, G23n; ST, Cu-n)

1242-Q. (Russian.) **Relationship Between Fatigue and Rupture Strength of Alloys at High Temperatures.** V. A. Parfenov. *Metallovedenie i Obrabotka Metallov,* no. 6, 1957, p. 17-23.

Specimens of E1617, E1395, E1437 and E1602 studied at 50 cycles per sec. The curves for both strengths, plotted in the same stress-time-to-failure coordinates, intersect. When testing times are short (200-500 hr.), fatigue of the alloy is more probable; when they are long, creep failure is more common. Studies on the temperature dependences of these two strengths reveal that under the experimental conditions there is a certain temperature below which fatigue, and above which creep, failure is more probable.
(Q7, Q3, 2-62; ST)

1243-Q. (Russian.) **Development of the Theory of Metal Fatigue.** I. A. Oding. *Vestnik Akademii Nauk SSSR,* no. 4, 1957, p. 24-30.

A number of fatigue phenomena are explained; directionality of cracking, effect of frequency of cyclic stressing on fatigue strength, and methods of increasing fatigue strength. Function of the stress gradient in fatigue failure, nature of scale factor and observed discrepancies between theoretical and effective concentration coefficients interpreted on the basis of dislocation theory. (Q7)

1244-Q.* (Russian.) **Dynamic Compressibility of Metals Under Pressure From 400,000 to 4 Million Atmospheres.** L. V. Altshuler, K. K. Krupnikov and M. I. Brazhnik. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki,* v. 34, Apr. 1958, p. 886-893.

Method for determination of pressures and densities of shock compression is based on measurement of velocities of propagation of strong shock waves. Dynamic compressibility of Cu, Zn, Ag, Cd, Sn, Au, Pb and Bi measured in the pressure range from 40,000 to 4,000,000 atm. The highest degrees of compression (2.26 and 2.28 times) were observed in Pb and Bi, elements with the highest atomic volumes. (Q28g, 3-74)

1245-Q.* (German.) **Temper Brittleness in Alloy Steel Castings.** Richard Werner. *Giesserei,* v. 45, Sept. 11, 1958, p. 556-560.

Experiments with test pieces from Cr-Mn, Mn-Si and Cr-Mo steels. Brittleness shown when steels of the first two groups in cooling after tempering were allowed to pass slowly through the range from 540 to 450° C. Therefore, after tempering, water quenching down to between 100° and 200° C.

1246-Q.* (German.) **Pre-stressing Effect on Soft and Medium-Hard Steels.** Hubert Hoff and Georg Fischer. *Stahl und Eisen,* v. 78, Sept. 18, 1958, p. 1313-1320.

Several blown steels of a tensile strength of 30 to 75 kg/mm^2 and two soft, rimming openhearth and basic steel respectively were tension, compression and bend tested. Pre-stressing (Bauschinger) effect increases with tensile strength and disappears in heating at stress-relief temperatures.

1247-Q. **Effect of Frequency and Temperature on Fatigue of Metals.** S. R. Valluri. *National Advisory Committee for Aeronautics,* Tn 3972, Feb. 1957, 15 p.

Phenomenological considerations applied to a standard-linear-solid physical model indicated that for particular temperatures there are corresponding frequencies of fatigue stressing above which the fatigue behavior changes. (Q7, 2-61)

1248-Q. (Russian.) **Study of Cold Shortness Resistance of Some Steel Compositions.** A. P. Sanina and M. M. Timofeev. *Metallovedenie i Obrabotka Metallov,* Aug. 1958, p. 57-58. (Henry Brutcher, Altadena, Calif., Translation no. 4324.)

Most effective for increasing cold shortness resistance are Mn, Si and Cr. (Q26s, 2-60; AY, *Cr, Mn, Si*)

1249-Q.* **Low-Temperature Embrittlement of Austenitic Cr-Mn-N-Fe Alloys.** F. W. Schaller and V. F. Zackay. *American Society for Metals, Transactions,* v. 51, Preprint no. 109, 1958, 15 p.

The ductility of austenitic Cr-Mn-N-Fe alloys is studied as a function of test temperature, interstitial content and strain rate. The low-temperature brittleness encountered was explained using a model with strain-induced martensite as the embrittling agent. At high strain rates, an anomalous increase in reduction of area was found and attributed to a localized temperature increase of the specimen. 23 ref.
(Q26s, 2-63; SS, *Cr, Mn*)

1250-Q.* **Mechanical Properties of Deformed Metastable Austenitic Ultra High Strength Steel.** D. J. Schmatz and V. F. Zackay. *American Society for Metals, Transactions,* v. 51, Preprint no. 110, 1958, 13 p.

Austenitic alloy steels containing 0.28 to 0.98% C were deformed at subcritical temperatures and subsequently transformed to martensitic structures. A hardness increase from 2 to 4 points Rockwell "C" was obtained with deformations ranging from 25 to 75% with attendant increases in tensile strength and yield strength. Yield strengths in excess of 300,000 psi. were obtained by tempering the deformed steels. At this strength level, ductilities of from 6 to 8% were consistently reproduced. Electron micrographs of the deformed steel indicated a refinement of the martensite. 18 ref.
(Q-general, N8, 3-68; AY, SGB-a)

1251-Q.* **Mechanical Properties of Fe-Al-Si Alloys at Room and Elevated Temperatures.** D. J. Schmatz and V. F. Zackay. *American Society for Metals, Transactions,* v. 51, Preprint no. 111, 1958, 11 p.

Investigation of properties of Fe-Al-Si alloys containing 5 to 9% Al and 0.5 to 2.4% Si. Si increased strength at both room and elevated temperatures. Ductility was markedly decreased by Si and interstitial elements. Si appeared to be more than additive to Al in improving oxidation resistance. Si raised order—disorder temperature and was additive to Al in initiating long-range order. Correlation between ordering temperature as determined by electrical resistivity and creep rate was noted. 9 ref. (Q-general, 2-60, 2-61, P15g; Fe-b, *Al, Si*)

1252-Q.* **A Compilation and Interpretation of Cyclic Strain Fatigue Tests on Metals.** J. F. Tavernelli and L. F. Coffin, Jr. *American Society for Metals, Transactions,* v. 51, Preprint no. 112, 1958, 13 p.

Cyclic-strain fatigue data from several investigators and the author's studies are compiled and interpreted from a plastic strain range point of view. The relationship

$N^{1/2}\Delta\varepsilon_p = C$ best fits all the available data regardless of the metals tested, the temperature of testing and the manner of testing. Here N is the number of cycles to failure, $\Delta\varepsilon_p$ the plastic strain range, and C a constant. The significance of the fracture ductility to low-cycle fatigue is also discussed. When the fracture strain value is placed on the fatigue curve at N = ¼, good agreement results, thus giving a very simple method for predicting the fatigue behavior of the metal. 8 ref. (Q7, 1-54)

1253-Q.* **The Effects of Microstructure and Heat Treatment on the Hydrogen Embrittlement of Alpha-Beta Titanium Alloys.** D. N. Williams, F. R. Schwartzberg and R. I. Jaffee. *American Society for Metals, Transactions*, v. 51, Preprint no. 113, 1958, 13 p.

Four alpha-beta Ti alloys examined to determine the effects of heat treatment, alpha grain size and alpha grain shape on the amount of hydrogen required to induce low strain rate embrittlement (for example, their hydrogen tolerance). The tolerance was markedly dependent upon heat treatment, decreasing as the heat treatment temperature was lowered. Strength level did not appear to affect the hydrogen tolerance significantly. Increased alpha grain size decreased the hydrogen tolerance as did acicular grain shape. Strain-induced hydride was observed in a number of specimens and a tentative relationship between impact embrittlement, strain-induced hydride and low strain rate embrittlement was developed. Alloys were classified from most to least resistant to hydrogen embrittlement in the following order: Ti-6Al-4V, Ti-4Al-4Mn, Ti-8Mn, and Ti-2Mo-2Fe-2Cr. 9 ref. (Q26s, 2-64, 3-71; Ti-b)

1254-Q.* **Properties of As-Cast and Heat Treated 2% Moybdenum-Uranium.** E. G. Zukas. *American Society for Metals, Transactions*, v. 51, Preprint no. 115, 1958, 6 p.

Tensile and impact properties were determined for 2% Mo-U alloys from −198 to 100° C. after the following heat treatments: (a) as-cast, (b) water quenched from 850° C., (c) water quenched from 850° C. followed by aging at 450° C. for 1 hr., (d) homogenized and furnace-cooled, and (e) water quenched from 625° C. The tensile strengths reached a maximum at temperatures below −30° C. This temperature was influenced by heat treatment. Tensile and yield strengths well over 200,000 psi. were obtained by treatment (c) but the alloy was quite brittle after this treatment. Impact strengths were generally low, especially below −30° C. A homogenization treatment followed by furnace cooling appeared to be a satisfactory and practical heat treatment. 5 ref.
(Q27a, Q6n, 2-64; U-b, *Mo*)

1255-Q.* **Applications and Properties of Nodular Cast Iron.** A. D. Main. *Castings*, v. 4, Aug. 1958, p. 9-21.

Properties of nodular cast iron; examples illustrate applications arising from these properties. 6 ref. (Q-general, 17-57; CI-r)

1256-Q.* **Effect of Alloying Elements on Creep Behavior.** J. Glen. *Iron and Steel Institute, Journal*, v. 190, Oct. 1958, p. 114-135.

A simple theory is developed to explain transitions in creep rate and to show the effect of stress and temperature. Proof of this theory is given by the results of many creep tests on steel. The effects of N, C, Mn, Cr, Mo, V, Ti and Si as alloying elements. Results of creep tests on austenitic alloys and Ti alloys show that transitions in creep rate are a common occurrence in most commercial alloys. 34 ref. (Q3; 2-60; AY)

1257-Q.* **Recent Developments in Creep Testing by the Cantilever Bending Method.** G. T. Harris, H. C. Child, A. B. Collier and C. F. West. *Iron and Steel Institute, Journal*, v. 190, Oct. 1958, p. 136-143.

Cantilever creep units are capable of carrying out tests at temperatures up to 1200° C., at stresses of from 50 psi. to 50 tons per sq. in. with a sensitivity of strain measurement of from 1 to 3 × 10^{-6}. Several suitable applications of these units are exemplified. Satisfactory correlation of cantilever creep data with tensile data is possible. 4 ref. (Q3, 1-54)

1258-Q.* **Effect of Cold Work on the Fatigue Characteristics of an Austenitic Alloy Steel.** B. Cina. *Iron and Steel Institute, Journal*, v. 190, Oct. 1958, p. 144-157.

The limited beneficial effect of static cold work on the fatigue limit in alternating stress has been found to be due to the operation in the fatigue limit of a Bauschinger effect. A much greater benefit from cold work was obtained for pulsating tensile than for alternating stress. Light tempering after static cold work failed to raise the fatigue limit in alternating stress. 28 ref. (Q7a, 3-68; SS, *Mn, Ni*)

1259-Q.* **Microhardness Testing.** Vincent E. Lysaght. *Tool Engineer*, v. 41, Oct. 1958, p. 87-90.

Microhardness testing techniques provide accurate quality control for applications where conventional hardness testing equipment cannot be used. Examples are thin materials, plated coatings, small diameter wire and small precision parts. It is used to determine hardness gradients in superficially hardened surfaces, for exploring hardness variations over small areas, for determining the hardness of different alloy constituents. Microhardness testers fall into two general groups: those based on the scratch method and those operating on the indentation principle. (Q29q)

1260-Q.* (German.) **Steel Castings With Special Properties.** Ju. A. Nechendsi. *Freiberger Forschungshefte*, v. B24-3, July 1958, p. 19-46.

Wear resistance, heat resistance, corrosion resistance, magnetic and nonmagnetic properties; use for tools. (Q9, Q-general, 2-62, R-general, P16; ST, 5-60)

1261-Q.* (German.) **Elastic Residual Stresses in Case Hardened and Nitride Hardened Steel Parts Detected With X-Rays.** Helmut Hasenmeier. *Harterei-Technische Mitteilungen*, v. 12, no. 2, 1958, p. 23-37.

Stresses tested by X-ray diffraction. Best results obtained with an X-ray tube with Cr anode. To obtain pure K alpha-ray diagrams, a monochromator is used. By progressive electrolytic or chemical etching stresses in different depths could be examined.
(Q25h, 1-53, M22g, J28; ST)

1262-Q.* (German.) **Long-Time Stress Testing in Multiple Instruments Above 500° C. Pt. 2.** H. Wiegand. *Metall*, v. 12, Sept. 1958, p. 803-810.

Elongation tests with heat resistant materials. Testing instrument and furnace; preparation of samples, torsional stress resulting from the fastening in the specimen holders; distribution of hardness in machined notches. 10 ref.
(Q3, 17-53, Q29; SGA-h)

1263-Q.* (Russian.) **Micro-Heterogenous Deformation of Metals While Being Heated at High Temperatures.** M. G. Lozinskii, M. B. Guterman and E. I. Antipova. *Metallovedenie i Obrabotka Metallov*, June 1958, p. 6-9. (Henry Brutcher, Altadena, Calif., Translation no. 4245.)

Effect of high temperature and stress on flow characteristics of specially prepared metallic samples; definite local displacement found. To facilitate measurement of deformation, a pattern of indentations was made on the polished surface of the samples by a diamond point. After subjecting the samples to heat and stress the pattern was photographed. Displacement seems to be related to surface curvature of individual grains. 5 ref.
(Q24, 2-62)

1264-Q.* (Russian.) **Effect of Plastic Deformation on Heat Resistance of Alloy No. EI437.** S. T. Kishkin, A. A. Klypin and A. M. Sulima. *Metallovedenie i Obrabotka Metallov*, June 1958, p. 18-21. (Henry Brutcher, Altadena, Calif., Translation no. 4248.)

Plastic deformation exerts considerable influence on the durability of dispersion-hardening alloys such as EI437, greatly reducing it at 700-800° C. It is associated with the acceleration of basic dispersion processes resulting from lowering of tensile strength. At lower temperatures, when dispersion is retarded, grains break down into blocks, while at higher temperatures tensile strength is reduced. Fracture usually takes place near grain and twin boundaries. 5 ref.
(Q-general, 2-62, 3-68; Ni-b, SGA-h)

1265-Q.* (Russian.) **Raising Working Temperature of Steam Turbine Flat Spring Seals to 640°.** T. I. Volkova. *Metallovedenie i Obrabotka Metallov*, June 1958, p. 21-25.

According to technical requirements the springs were to maintain resilience under a load of 12 kg. per sq. mm. after an exposure to 585-640° for 10,000 hr. Several Soviet and foreign austenitic and Ni steels were tested. Mechanical properties, chemical composition and test results tabulated. (Q27a, Q23p, 2-62, T7c, 17-57; SS, AY, *Ni*)

1266-Q.* (Russian.) **Heat Resisting Properties of Copper-Chromium and Copper-Nickel Alloys.** A. P. Simakovskii. *Metallovedenie i Obrabotka Metallov*, June 1958, p. 41-47. (Henry Brutcher, Altadena, Calif., Translation no. 4253.)

While it is known that Cu is a corrosion resistant metal it is not sufficiently heat resistant above 250°. Cr raises heat resistance of Cu. Bars made up of Cu alloy containing Cr and Ni, respectively, as well as other elements, were subjected to extensive physical tests. Based on the results of these tests the Cu-Ni alloy no. MN5 is recommended for wide range of applications. 4 ref.
(Q-general, 2-62; Cu-b, *Cr, Ni*)

 (*)Articles Available Through Photocopy Service; See Coupon, p. 91.

1267-Q. Electromagnetic Vibrators. *Iron and Steel,* v. 31, Oct. 1958, p. 504-506.

Use in creep and fatigue tests over a wide range of temperatures. (Q3, Q7, 1-53)

1268-Q. Strength Reduction of Metallic Single Crystals Due to Adsorption and Spontaneous Dispersion in a Liquid Medium. P. A. Rebinder. *Doklady Akademii Nauk SSSR,* v. 111, no. 6, 1956, p. 1278-1281. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB4.)

(Q27a, P13; 14-61)

1269-Q. Influence of Phosphorus on Properties and Structure of Gray Cast Irons. M. Ferry. *Fonderie,* no. 121, Feb. 1956, p. 55-66. (British Cast Iron Research Assoc., Alvechurch, Birmingham, Translation no. 827.)

(Q-general, 2-60; CI, *P*)

1270-Q. Use of Yield and Fracture Under Multiaxial Stress. K. Matthaes. *Metallwissen und Technik,* v. 10, no. 17-18, p. 795-800. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB29.)

(Q26; ST, 3-66)

1271-Q. Investigations Into Damping in Annealed or Cold Rolled Alpha Iron in the Presence of Small Additions of Carbon and Nitrogen. W. Koster. *Publications de l'Association des Ingenieurs de la Faculte Polytechnique Mons,* no. 3, 1956, p. 1-13. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB43.)

(Q8; Fe, *C, N*)

1272-Q. Elimination of High Brittleness in Hot Rolled Transformer Sheet. V. A. Koreleva and M. I. Sherstyuk. *Stal',* v. 16, 1956, p. 545-548. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB95.)

Previously asbstracted from original. See item 788-Q, 1956. (Q26s, N8, J23; SGA-n)

1273-Q. Electrical Resistance and Plastic Deformation of Metals. H. G. Van Buren. *Zeitschrift für Metallkunde,* v. 45, no. 4, 1955, p. 272-281. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-6G8G.)

(Q24, P15g)

1274-Q. (Russian.) **Determination of Hardness by Scratch Test.** V. K. Grigorovich. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 1007-1012.

7 ref. (Q29d)

1275-Q. (Russian.) **Determination of Mechanical Properties of Steel by Measurement of Its Coercive Force.** B. S. Natapov and E. S. Fal'kevich. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 1013-1014.

4 ref. (Q-general, P16; ST)

1276-Q. (Russian.) **Study of Inclination of Steel to Brittleness Under Industrial Conditions.** E. M. Shevandin. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 1017-1024.

Relation between changes in dimensions of steel (length, thickness, etc.) and brittleness. Bend tests were made on structural steels. 14 ref. (Q26s, Q5, P10d; ST)

1277-Q. (Russian.) **New Hardness Number and Mechanical Properties of Steel.** M. S. Drozd. *Zavodksaya Laboratoriya,* v. 24, no. 8, 1958, p. 1002-1007.

Results of testing of many grades of steel with hardness H_B from 95 to 498 kg. per sq. mm. 8 ref. (Q29n; ST)

1278-Q. (Russian.) **Use of Radioactive Isotope Method in Study of Wear Resistance of Metals.** D. G. Tochil'nkov. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 965-971.

Marked atoms are used for investigating wear resistance of metals and metal coatings by studying their preliminary activation in the surface of the test specimen. (Q9, 1-59)

1279-Q. (Spanish.) **Three Key Figures in the Classification of High-Grade Construction Steels.** Rafael Calvo. *Instituto del Hierro y del Acero,* v. 11, Apr-June 1958, p. 97-103.

Hardenability, martensite transformation, temperature and temperability as criteria; factors that influence these characteristics. (Q-general, J5, N8p; ST)

1280-Q.* Spiral Bending Test for Electrodeposited Coatings. J. Edwards. *Institute of Metal Finishing, Bulletin,* v. 8, Summer 1958, p. 101-106.

Method of measuring ductility. Plated strip is bent round a former in the shape of an equiangular (logarithmic) spiral and the radius of curvature at which the coating cracks is read off directly from graduations on the former. The percentage elongation at this point is calculated from radius of curvature and the thickness of plated strip. (Q5, 1-54; 8-12)

1281-Q. Some Principles for Developing Alloys Based on Borides of High-Melting Metals. K. I. Portnoi and G. V. Samsonov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 7, 1958, p. 140-141. (Henry Brutcher, Altadena, Calif., Translation no. 4344.)

Basic principles useful as guides in developing high-temperature alloys based on borides of refractory metals. Factors determining mechanical strength and plasticity; high-temperature strength; scaling resistance; thermal fatigue. (Q-general, 2-62; EG-d37, *B*)

1282-Q. (Czech.) **Effect of Arsenic on the Properties of Steel.** F. Benes. *Hutnické Listy,* v. 12, no. 1, 1957, p. 85-96.

Effect of 0.01-0.27% As on the properties of low-carbon (0.1% C), high-carbon (0.7% C), Cr-Mn-Si-Cu and Cr-Ni-W-Cu steels. As increases tensile and yield strength and decreases elongation and impact value of steel with 0.1% C, and hardly affects the properties of steel with 0.7% C. In alloy steels heat treated for high stability, it does not affect yield strength but decreases impact value. (Q-general, 2-60; AY, *As*)

1283-Q.* (French.) **Influence of Polygonization on the Mechanical Properties of Aluminum-Zinc Solid Solutions.** P. Gobin and J. Montuelle. *Comptes Rendus,* v. 247, July 28, 1958, p. 456-458.

Whereas polygonization almost completely prevents structural hardening of Al-Zn alloys after air quenching at 20° C., it only diminishes hardening after water quenching at 16° C. It also renders the alloy less sensitive to effect of a static stress slightly lower than the elastic limit; hence, polygonization acts as a stabilizing factor. (Q24, Q-general; Al, Zn)

1284-Q. (Russian.) **Optimum Chemical Composition of Type 1KH18N9T Stainless Steel.** M. I. Vinograd. *Metallurg,* no. 5, 1957, p. 13-16.

Limits for C and alloy content. Study of a large number of casts has shown that to obtain steel with small percentages of alpha-phase and not sensitive to intercrystalline corrosion, it is advantageous to specify different Cr, Ni and Ti contents for the steel, according to whether it is intended for tube or for plate. (Q-general, R2h, 2-60; SS)

1285-Q. (Rumanian.) **Properties of Low-Alloy Manganese-Molybdenum Steel for Structural Purposes.** B. Rotenstein. *Studii si Cercetari Metallurgie,* v. 1, no. 2, 1956, p. 261-282.

Influence of Mn, Cr, Mo, Cu and C on mechanical properties (tensile strength, Rockwell hardness, impact value) and microstructure of 11 Mn-Mo steels; also on hardenability, reversible temper, brittleness, corrosion resistance and weldability. Low-alloy Mn-Mo steel with small additions of Cu and Si possesses sufficiently high mechanical properties and improved corrosion resistance and can be used as a substitute for Cr-Ni and Cr-Mo steels. (Q-general; AY, SGB-s, *Mn, Mo*)

1286-Q. (Russian.) **Increase in Durability of Cast Steel Propellers Using 1Kh14ND Stainless Steel.** A. M. Veingarten, M. L. Rozen, N. N. Sokolov, K. P. Lebedev, E. N. Liberman and E. K. Remizova. *Sudostroenie,* no. 3, 1957, p. 36-40.

Microstructural, mechanical and corrosion resisting properties of cast stainless steel containing C 0.05, Si 0.06, Mn 0.42, Cr 13.5, Ni 1.5, Cu 1.37, S 0.014, P 0.018, after various heat treatments. As quenched, the microstructure consists of coarse acicular martensite, with Cr-rich ferrite along the austenite grain boundaries. The best combination of strength and ductility is obtained after quenching in air from 1000-1050° C. and tempering at 680-700° C. The cooling rate after quenching and tempering has no noticeable influence on mechanical properties. (Q-general, M27, 2-64; SS)

1287-Q. (Russian.) **Mechanical Properties of Steel 55C2 at High Temperatures.** V. K. Prourzin. *Trudy Donetskogo Industrialnogo Instituta,* v. 19, no. 5-7, 1957, n.p.

To find the optimum rolling temperature for steel 55C2 the effect of temperature within the limits 20-1100° on tensile strength, yield strength and elongation was studied. Samples were quenched in oil from 860° and then annealed at 400° for 1 hr Tensile strength hardly changes up to 500°, but then drops sharply. In the range 820-900°, a halt in the drop of yield strength is observed, which is connected with recrystallization and change in grain size. (Q27a, 2-62, F23; ST)

1288-Q. (Slovenian.) **Replacement of Nickel by Other Alloying Elements in Standard Structural Steels.** Vasilij Terseglav. *Nova Proizvodnja,* v. 7, no. 6, 1956, p. 362-370.

Comparison of mechanical properties of Cr-Ni steels with Cr, Cr-Mo and Cr-Ni-Mo steels after various forms of heat treatment shows that it is possible to replace a number of steels containing from 1.5 to 4.5% Ni by lower alloy steels by additions of Mo. (Q-general, 2-60; AY, *Ni, Mo,* SGB-s)

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

1289-Q.* Grain-Size and Its Influence on the Properties of Metals and Alloys. K. Camenisch. *Sheet Metal Industries,* v. 35, Aug. 1958, p. 589-594. (From *Pro-Metal,* v. 9, Aug. 1956, p. 699-702.)

Previously abstracted from original. See item 925-Q, 1956.
(Q24, J23, M27)

1290-Q. (Czech.) **Effect of Some Factors on the Relaxation of Materials at High Temperatures.** Z. Lubomir. *Hutnické Listy,* v. 12, no. 4, 1957, p. 335-342.

Effect of temperature, initial stress and heat treatment on relaxation characteristics of metals at high temperatures, study of effect of surface coatings of Cr, Cr-Al and S on relaxation characteristics of Cr-W-V steels. The Oding method on ring specimens was employed. Surface layers produced on steel by impregnation do not appreciably affect relaxation. (Q3, AY)

1291-Q. (Russian.) **Effect of Thermomechanical Treatment on the Temper Brittleness of Alloy Structural Steels.** E. N. Sokolkov and L. V. Smirnov. *Metallovedenie i Obrabotka Metallov,* no. 3, 1957, p. 31-35.

Effect of combining hot plastic deformation with tempering in conditions which excluded the recrystallization of cold worked austenite as a cause of the tendency to reversible temper brittleness of 37XH3A, 35XGCA and 40XH4 steels. Samples of 37XH3A steel were heated to 1000°, cooled to 900°, rolled and tempered. Some of the samples were tempered without rolling. Testing of impact value after annealing in the range 200-650° showed that the combination of plastic deformation with tempering suppresses to a considerable extent the development of temper brittleness, eliminating fracture along the austenitic grain boundaries. (Q26s, Q24, J29; AY)

1292-Q. (Russian.) **Ductility of Cold Rolled Transformer Steel.** A. G. Petrenko, A. V. Smirnova and L. A. Kurtova. *Stal',* no. 5, 1957, p. 453-456.

Study of the structure showed that ductility is determined by the amount and form of the carbide phase. Coarse precipitates of carbide phase appear along the boundaries and inside the grains in specimens of low-ductility metal and there is also a zone of a eutectoid type of separation. In specimens which have received a great amount of bending, the amount of precipitated carbide phase is considerably less and the main mass is disposed within the grains as globules. Repeated annealing of the brittle metal at 750-850° decreases the amount of carbide phase and raises the ductility sharply.
(Q23p, N8r; AY, SGA-n)

1293-Q. (Russian.) **Properties of 20-XGP Steel.** N. I. Letchford. *Stal',* no. 6, 1957, n.p.

Substitution for 20XHM of a cheaper steel not containing scarce elements did not result in a lowering of resistance to wear and stability of the components, but enabled the carburization process to be accelerated by 10-12% and did away with the need for high-temperature tempering after normalization of forgings. 20XGP steel, deoxidized by Ti, is prepared with a grain size of 6-7, and has tensile strength of 100 kg. per sq. mm., yield strength 80 kg. per sq. mm., elongation 9%, impact value 8 kg. per sq. cm.
(Q-general, 2-60; AY)

1294-Q. (Russian.) **Heat Resistant Cast Iron.** P. I. Durasov, B. S. Mil'man and N. A. Aleksandrov. *Standartizatsiya,* no. 2, 1957, p. 58-61.

Heat resistant alloy cast iron has been widely adopted. Composition is: Cr 0.3-0.5; Si 4.5-6.5 and Cr 0.5-1.5, Ni 14.0-17.0, Cu 6.0-8.5 and Cr 1.5-2.5. Silicon heat-resistant cast iron with spheroidal graphite has best heat resistant and mechanical properties. Spheroidal graphite is provided by treatment with Mg.
(Q-general, 2-62; CI-r, CI-q; *Si*)

1295-Q. (Russian.) **Properties of EI-257 Steel After 20,000 Hours in Service.** T. A. Mikhailova. *Teploenergetika,* no. 3, 1957, p. 41-44.

Structure and properties of EI-257 steel, used in the steam tubes of a uniflow boiler working at 600° and at a pressure of 300 atm. Composition of the steel after 20,000 hr. of service was C 0.11, Mn 0.33, Si 0.42, Cr 13.65, Ni 12.0, W 2.5, Mo 0.68. Metallographic tests of base metal and welded joints were made, together with mechanical and corrosion tests. Results are related to the specified period of service of the metal after 3000, 7500 and 14,000 hr. Standard boiling tests showed no decrease in the susceptibility of the steel to intercrystalline corrosion after 20,000 hr. service.
(Q-general, R4; SS)

1296-Q. (Russian.) **Resistance of Metastable Nitride Phases to Wear and Corrosion.** P. L. Gordienko and A. V. Smirnov. *Trudy (Leningradskii Institut Aviatsionnogo Priborostroeniya),* no. 22, 1957, p. 23-28.

Specimens of technically pure Fe were nitrided and subsequently quenched under various conditions to obtain the nitride phases on the surface, and then tested for wear and corrosion in a 3% solution of NaCl. Tests indicate that a mixture of nitride austenite and nitride martensite had little resistance to omega, the martensite being the more resistance and the beta phase less resistant than martensite.
(Q9, R6j, 2-64; ST)

1297-Q.* Progress in Zirconium Technology. *Nuclear Technology Briefs: Reactor Core Materials,* no. TI-10, Sept. 25, 1958, 9 p.

Corrosion resistance, high-temperature tensile properties and creep characteristics of Zr and Zircaloy 2 and effect of neutron irradiation on mechanical properties. Use of Zr and Zr alloys in nuclear power reactors. (Q-general, R-general, 2-67, T11, 17-57; Zr)

1298-Q.* Tensile Properties and Rolling Textures of Niobium Sheet. F. J. Anders, Jr. and W. I. Pollock. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 60-65.

Room-temperature tensile properties and hardness of Cb sheet correlated with impurity content, annealing temperature and microstructure. Rolling texture for cold rolled and recrystallized sheets. Behavior is similar to alpha iron in both tensile tests and rolling texture. 9 ref.
(Q27a, Q29n, M26c; Cb, 4-53)

1299-Q.* The Ductile-to-Brittle Transition in Niobium. E. T. Wessel and D. D. Lawthers. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 66-76.

Study of deformation and fracture characteristics of commercially pure Cb with particular emphasis on the ductile-to-brittle transition; influence of strain rate, microstructure and impurity content on temperature range of transition. For materials investigated the transition occurred in range of −100 to −200° C. and apparently was not affected by variations in impurity level. 23 ref. (Q23r; Cb)

1300-Q.* The Effect of Rare Earth Metal Additions on the Ductility of Arc-Melted Group Va Metals. J. W. Semmel, Jr. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 77-80.

Semipure V, Cb, and Ta were arc-melted with rare earth metal additions, producing relatively soft alloy buttons which were cold rolled successfully. Under similar conditions but without the rare earth metal additions, these metals were hard and could not be cold rolled. A Cb-Ce alloy was considerably stronger than commercial ductile Cb. 4 ref.
(Q23p, C5h, 2-60, Cb, Ta, *EG-g*)

1301-Q.* (Japanese.) **Effect of Surfaces on the Strength of Metals.** M. Terasawa. *Metals,* v. 28, Oct. 1958, p. 746-751.

Well-finished metal shows high creep limit but if not well finished it fails on repeated stress and bending. This is especially so in the resistance of steel to repeated strain. However, nitrated steel is not affected much by unevenness.
(Q27a, 3-70; ST)

1302-Q. (Russian.) **Effect of Mercury on the Strength and Durability of Structural Materials.** G. V. Karpenko, A. I. Yatsyuk and F. P. Yanchishin. *Nauchnye Zapiski Instituta Mashinovedeniya i Automatiki (Akademiya Nauk USSR). Seria Mashinovedeniya,* v. 6, 1957, p. 42-49.

Effect of Hg amalgamation on the mechanical properties of steel, brass and duralumin. Liquid Hg significantly lowered the tensile strength of brass test pieces (by 32%) while that of duralumin fell by 12%. The elongation figure of brass and duralumin fell to 0. Liquid Hg showed no effect on ground steel 30Kh, or on Cu. Endurance under cyclical load test was sharply reduced.
(Q-general; ST, Cu-n, Al-b, *Hg*)

1303-Q. (Russian.) **Mechanical Properties of Cast Rhenium. E. M. Savitskii and M. A. Tylkina.** ***Trudy Instituta Metallurgii Akademii Nauk SSSR,*** **v. 1, 1957, p. 158-161.**

Re castings were obtained by melting baked metal powder in an argon-arc furnace. Tests in the temperature range from − 194 to +1150° showed that Rockwell hardness changes from 400 to 134 kg. per sq. mm. Ductility at 20 and 1000° determined. Cold working increases hardness by about 80%. Temperature of start of recrystallization is about 1500°. 7 ref.
(Q-general, N5; Re)

1304-Q. (Russian.) Influence of Temperature on the Mechanical Properties of Alkaline Earth Metals. E. M. Savitskii and V. F. Terekhova. ***Trudy Instituta Metallurgii Akademii Nauk SSSR,*** **v. 1, 1957, p. 162-169.**

Strength, hardness and ductility in tension of Mg, Ca, Sr and Ba investigated in the temperature range 20-800°. With regard to decrease in strength and hardness at 20° the metals can be arranged in the fol-

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

lowing order: Mg, Ca, Sr, Ba. On raising the temperature to 550° their hardness and strength become equal. The change of mechanical properties with temperature proves the presence of two polymorphous phases in Ca and Sr.
(Q-general, 2-61; Mg, Sr, Ca, Ba)

1305-Q. (Russian.) **Problem of Improving the Quality of Rails.** O. N. Uskova. *Zheleznodorozh Transport,* no. 2, 1957, p. 40-44.

Failure of rails R50 and R65 is due to defects resulting from contact stresses and also from nonmetallic inclusions. Quality of rails could be raised both by quench hardening and alloying and by improving melting technique.
(Q-general, J26, D9, T23q; ST)

1306-Q. The Structure of Steel. Edwin Gregory and Eric N. Simons. *Edgar Allen News,* v. 37, Aug. 1958, p. 174-176.

(Q28, Q29, Q6, Q5, P10d; ST)

1307-Q. Toughen Mild-Carbon Steels With Columbium. *Iron Age,* v. 182, Oct. 30, 1958, p. 96.

(Q-general; CN-b, *Cb*)

1308-Q. Friction as Resistance to Shear of Thin Surface Layers on Solids. G. I. Epifanov. *Doklady Akademii Nauk SSSR,* v. 114, no. 4, 1957, p. 764-767. (Henry Brutcher, Altadena, Calif., Translation no. 4327.)

New method of study of sliding friction between clean metal surfaces entailing the use of freshly cut surfaces and high normal stresses to preclude any contaminating surface films. (Q9p)

1309-Q. Generalized Creep Criteria Diagram Based on New Relationships Among Stress, Creep Rate and Service Life. I. A. Oding and V. S. Ivanova. *Issledovaniya Po Zharoprochnym Splavam,* v. 1, 1956, p. 52-59. (Henry Brutcher, Altadena, Calif., Translation no. 4235.)

More accurate relations among stress, creep rate and time to failure permit a linear extrapolation of the results of short-time (2000 hr. and less) rupture tests to long periods (of the order of 10,000 or 100,000 hr.). (Q3)

1310-Q. Influence of Alloy Components on the Hardness of Nickel Alloys at High Temperatures. M. E. Blanter. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 12, 1956, p. 88-95. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB45.)

(Q29n, 2-62; Ni-b)

1311-Q. Determination of Cutting Performance of Tungsten Carbide With Cobalt and/or Nickel as Binders. N. F. Kazakov and M. N. Andrianova. *Stanki i Instrument,* no. 5, 1957, p. 24-25. (Henry Brutcher, Altadena, Calif., Translation no. 4334.)

Previously abstracted from original. See item 134-Q, 1958.
(Q9n, T6n; W, *Ni, Co,* 6-69)

1312-Q. (Czech.) **Internal Friction in Austenitic Steels.** J. Vodsedalek. *Strojirenstvi,* v. 6, no. 11, 1956, p. 757-762.

Damping properties, over a wide range of loads and working temperatures, of heat resisting steels, based on Fe with additions of Cr, Ni, Co, used as steam turbine blade materials. Problems of fatigue strength at high temperatures and effects of initial amplitude of vibration, prolonged cyclic and static stress conditions. Mechanism of damping of vibrations in austenitic steels is connected with the formation and migration of dislocations and the formation of new phases.
(Q22; SS, *Cr, Ni, Co*)

1313-Q. (German.) **Evaluation of Notch Impact-Bending Tests.** G. Schutz. *Fertigungstechnik,* v. 8, Sept. 1958, p. 413-417.

Tables for fast and precise determination of impact strength. (Q6)

1314-Q. (Russian.) **Procedure for Fatigue Testing at Variable Load Conditions.** D. N. Reshetov and S. A. Shuvalov. *Vestnik Mashinostroeniya,* v. 38, Sept. 1958, p. 3-7.

Since the majority of machine parts operate under continuously variable load conditions and changing amplitude, fatigue test was devised for industrial conditions where load varies every 30 sec. 10 ref. (Q7)

1315-Q. Strength of an Alloy Containing Zones. A. Kell and M. E. Fine. Northwestern University Dept. of Metallurgy. *U. S. Office of Technical Services,* PB 124768, Dec. 1956, 10 p. (Available at Library of Congress, Washington, D. C.—Microfilm $1.80; Photostats $1.80.)

Rough estimates of the stress necessary to force dislocation through a Guinier-Preston zone in an Al alloy containing 2 at.% Cu and in an Al alloy containing 13 at. % Ag. Suggested that the process of shearing the zones determines the initial flow stress in these age-hardening alloys. (Q24, N7a; Al-b)

1316-Q. Delayed Yielding in a Substitutional Solid Solution Alloy. L. A. Shepard and J. E. Dorn. California University, Institute of Engineering Research. *U. S. Office of Technical Services,* PB 125561, Feb. 1956, 36 p. (Available at Library of Congress, Washington D. C.—Microfilm $3; Photostats $6.30.)

Effect of temperature and stress on the delayed yielding arising for substitutional locking of dislocations in the face-centered cubic system. Specimens of an Al alloy containing 2% Mg were prestrained to 25,000 psi. at 78° K. and then aged for 15 min. at 273° K. to develop a pronounced yield point at 78° K. Delayed yielding tests were performed at 78 and 114° K. at a series of constant stresses below the upper yield point observed in a tensile test. The delay time for yielding was found to depend on the product of two separable functions of stress and temperature.
(Q24c; Al-b, *Mg*)

1317-Q. Activation Energies for Creep of High Purity Aluminum. O. D. Sherby, J. L. Lytton and J. E. Dorn. California University, Institute of Engineering Research. *U. S. Office of Technical Services,* PB 125935, Apr. 1956, 27 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.70; Photostats $4.80.)

Activation energies for creep of high-purity Al were obtained over the temperature range from 77 to 880° K. by rapidly changing the temperature during creep at constant stress. The experimentally obtained activation energy was shown to be insensitive to stress and strain. From 500 to 880° K. the activation energy for creep was found to be independent of temperature and equal to 35,500 cal. per mole which is the same as that for self-diffusion of Al. (Q3, P13a; Al-a)

1318-Q. Survey of the Recovery of Damping and Modulus Changes Following Plastic Deformation. Akira Hikata and Andrew Granato. Brown University, Metals Research Laboratory and Graduate Div. of Applied Mathematics. *U. S. Office of Technical Services,* PB 125954, Jan. 1957, 27 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.70; Photostats $4.80.)

Measurements of changes in attenuation and elastic constants with time following plastic deformation compared with results of a theory which assumes these changes are a result of dislocation pinning by deformation-induced point defects. A check of the temperature dependence is afforded by recovery measurements of Young's modulus for Cu.
(Q24, Q8; Cu)

1319-Q. Statistical Formulation for Creep of Metals. J. Lambert Bates, Taikyue Ree and Henry Eyring. Utah University, Institute for the Study of Rate Processes. *U. S. Office of Technical Services,* PB 125970, June 1956, 37 p. (Available at Library of Congress, Washington, D. C.—Microfilm $3; Photostats $6.30.)

A reasonable physical explanation of flow processes is found by use of tensile data. Parameters in the creep equation for a large number of metals and alloys evaluated.
(Q3)

1320-Q. Effect of Porosity on Mechanical Properties of Metals and Alloys. Vincent DePierre. Naval Gun Factory. *U. S. Office of Technical Services,* PB 126018, May 1956, 13 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.40; Photostats $3.30.)

Porosity has a deleterious effect on tensile strength, yield strength, elongation, impact and fatigue strength. Tensile strength and ductility are seriously lowered by small percentages of porosity. Yield strength is only slightly affected. (Q-general, 3-71, 9-68)

1321-Q. Tensile Properties of Zone-Refined Iron in the Temperature Range From 298 to 4.2° K. R. L. Smith and J. L. Rutherford. Franklin Institute, Laboratories for Research and Development. *U. S. Office of Technical Services,* PB 126111, Sept. 1956, 49 p. (Available at Library of Congress, Washington, D. C.— Microfilm $3.30; Photostats $7.80.)

The higher the purity, the lower the flow stresses and the better the low-temperature ductility. Yield stresses as low as 3800 psi. have been observed at room temperature and elongations of 10% have been observed at 4.2° K. The major portion of the ductility at 4.2° K. arises from twinning. Deformation by twinning at 4.2° K. is not suppressed by prestraining at room temperature and the twins occur all through the test. (Q27a, 2-63; Fe-a)

1322-Q. Engineering Application of the Absolute Rate Theory to the Creep of Cast Magnesium. Mervin B. Hogan. Utah University, Institute for the Study of Rate Processes. *U. S. Office of Technical Services,* PB 126152, Apr. 1955, 46 p. (Available at Library of Congress, Washington, D. C.—Microfilm $3.30; Photostats $7.80.)

Experimental data analyzed in terms of a four-element mechanical model as an analogue, in conjunc-

tion with the absolute rate theory. (Q3; Mg-b)

1323-Q. Elastic Constants of Magnesium and Magnesium Alloys. T. R. Long. Case Institute of Technology. *U. S. Office of Technical Services,* PB 126172, Jan. 1956, 26 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.70; Photostats $4.80.)

The adiabatic elastic constants of single crystals of Mg and dilute alloys of Mg with Ag, In and Sn measured by the ultrasonic pulse echo technique. Specific values given. (Q21; Mg-b)

1324-Q. Bending of Coated Zinc Crystals. L. C. Weiner. Columbia University, School of Engineering. *U. S. Office of Technical Services,* PB 126293, Aug. 1957, 5 p. (Available at Library of Congress, Washington, D. C.—Microfilm $1.80; Photostats $1.80.)

(Q24; Zn, 14-61)

1325-Q. Arc-Cast Molybdenum Base Alloys. M. Semchyshen and R. Q. Barr. Climax Molybdenum Co. *U. S. Office of Technical Services,* PB 126447, 1955, 435 p. (Available at Library of Congress, Washington, D. C.—Microfilm $11.10; Photostats $63.30.)

Deoxidation and hot plasticity; mechanical properties of wrought alloys; effect of variation in strain hardening on mechanical properties and recrystallization temperature; embrittlement resulting from exposure to elevated temperature; coatings for protection of Mo against oxidation. (Q-general; Mo-b)

1326-Q. V-Notch Charpy Impact Testing of Weld Metal and Heat Affected Zone Simultaneously. William P. Hatch, Jr., and Carl E. Hartbower. U. S. Arsenal. *U. S. Office of Technical Services,* PB 126527, Dec. 1955, 14 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.40; Photostats $3.30.)

Composite test is sensitive to variations in weld metal and heat affected zone toughness and to a seemingly minor variation in welding procedure. The test provides, at least in part, a method for evaluating the relative notch-toughness characteristics of weld metal and heat affected base metal in a natural environment. (Q6, K9r, 7-51)

1327-Q. Factors Responsible for Notch Embrittlement of High-Strength Steels. V. Weiss and E. P. Klier. Syracuse University Research Institute. *U. S. Office of Technical Services,* PB 126571, Dec. 1955, 45 p. (Available at Library of Congress, Washington, D. C.—Microfilm $3.30; Photostats $7.80.)

Hardenability studies for various heat treatments on 4340 steel with a Jominy specimen 2.5 in. diameter and 8 in. long. The two-step and 12-hr. austenitizing treatments were found to yield the best hardenability. Three treatments listed in sequence of increasing merit by notch tensile tests at room temperature on 1.1 and 1.5-in. diameter 4340 steel specimens are: conventional, Lockheed, two-step. Studies of the fracture process were conducted on 4340 steel and two Al alloys for qualitative comparison.
(Q26s, J5; AY, SGB-a)

1328-Q. Damping, Elasticity and Fatigue Properties of Titanium Alloys, High-Temperature Alloys, Stainless Steels and Glass Laminate at Room and Elevated Temperatures. E. R. Podnieks and B. J. Lazan. Minnesota University, Dept of Mechanics and Materials. *U. S. Office of Technical Services,* PB 128211, Mar. 1956, 93 p. (Available at Library of Congress, Washington, D. C.—Microfilm $5.40; Photostats $15.30.)

Resonant fatigue properties in form of curves determined for several characteristic types of parts of the materials named.
(Q7a, Q21, Q8; Ti-b, SS, SGA-h)

1329-Q. Research and Development of Wrought and Cast High-Temperature Alloys. R. R. MacFarlane, R. S. DeFries, E. E. Reynolds and W. W. Dyrkacz. Allegheny Ludlum Steel Corp. *U. S. Office of Technical Services,* PB 129969, Oct. 1954, 98 p. (Available at Library of Congress, Washington, D. C.—Microfilm $5.40; Photostats $15.30.)

Study of Co-base and Fe-base alloys. An alloy containing 10% Ni, 10% Cr, 10% W, 5% Mo and 1% Cb + Ta was outstanding in rupture properties for the wrought Co-base alloys at 1500 to 1700° F. An 18% Mn, 12% Cr, 3% Mo, 0.8% V alloy had a good combination of properties at 1200° F. for the wrought Fe-base alloys. Thermal shock properties were best for the cast alloys containing the highest Co. No correlation was apparent between thermal shock characteristics and other commonly measured properties.
(Q3, Q10a; Co, Fe, SGA-h)

1330-Q. Determination of Tensile, Compressive, Bearing and Shear Properties of Ferrous and Nonferrous Structural Sheet Metals at Elevated Temperatures. John V. Melonas and J. Robert Kattus. Southern Research Institute. *U. S. Office of Technical Services,* PB 131461, Sept. 1957, 308 p. $6.50.

Properties determined at various temperatures after exposure times of ½ to 1000 hr. at the test temperature for AISI 4130 alloy steel, 150,000-psi. nominal strength level; AISI 4130, 180,000-psi. nominal strength level; AISI 4130, 200,000-psi. strength level; A110-AT Ti alloy; HK 31-H24 Mg alloy; Type-301 stainless steel, full-hard. The Mg alloy was tested over a temperature range from 75 to 600° F., whereas the other metals were tested at temperatures up to 1000° F.
(Q27, Q28, Q2, Q9, 2-62; AY, Ti, Mg, SS)

1331-Q. Effects of Inelastic Action on the Resistance to Various Types of Loads of Ductile Members Made From Various Classes of Metals. Pt. 7. Inelastic Behavior of Aluminum Alloy I-Beams With Elliptic-Type Web Section Cutouts. Will J. Worley and Fred D. Breuer. Illinois Engineering Experiment Station. *U. S. Office of Technical Services,* PB 131556, Dec. 1957, 31 p. $1.

(Q24; Al-b)

1332-Q. Effect of Various Machining Processes on the Reversed-Bending Fatigue Strength of A-110 AT Titanium Alloy Sheet. Robert J. Rooney. Wright Air Development Center. *U. S. Office of Technical Services,* PB 131606, Nov. 1957, 14 p. $.50.

Results of reversed cantilever bending fatigue tests on A-110 AT (5% Al, 2.5% Sn) sheet, machined by various processes: ultrasonic, slab milling, chem-milling. Effect of shot-peening on the fatigue strength of the "as-rolled" alloy.
(Q7a, G17, G24; Ti-b)

1333-Q. Thermal Properties of High-Temperature Materials. I. B. Fieldhouse, J. C. Hedge, J. I. Lang and T. E. Waterman. Armour Research Foundation. *U. S. Office of Technical Services,* PB 131718, Feb. 1958, 88 p. $2.25.

Materials investigated were Hastelloy B, Hastelloy C, Satellite 21, stainless steels 17-7PH, and Type 446, silicon carbide, 60-15 Cr (AST M B 83-46), and Be. The thermal conductivity, specific heat and linear coefficient of thermal expansion were from 1000 to 3000° F., or the melting point of the material, whichever was lower. Experimental measurements and results of conversion of these measurements to the desired physical properties.
(Q-general, 2-62; SGA-h, Ni, SS, Be)

1334-Q. Fatigue Strength Reduction Factors for Inclusions in High-Strength Steels. H. N. Cummings, F. B. Stulen and W. C. Schulte. Curtiss-Wright Corp. *U. S. Office of Technical Services,* PB 131816, Apr. 1958, 39 p. $1.

Tentative values of fatigue strength reduction factors for nonmetallic, nonmalleable inclusions in single-nucleus fractures of rotating beam specimens are determined by two methods. Data for the computations are taken from tests on 309 specimens of SAE 4340 and 4350 steel, of 140,000, 190,000, 230,000, 260,000 and 300,000 psi. ultimate strength. Values of the factors depend upon size of the inclusions and upon hardness level of the steel. For very small inclusions (less than 0.00025 in.) other inhomogeneities inherent in the steel itself dominate the failure of a specimen.
(Q7a, 9-69; AY, SGB-a)

1335-Q.* Creep Under Changing Complex Stress Systems. A. E. Johnson, J. Henderson and V. Mathur. *Engineer,* v. 206, Aug. 22, 1958, p. 287-291.

Creep rate-complex stress-time relations in a 0.2% C steel at 450° C., on Al alloy RR59 at 150 and 250° C., and in a Mg alloy (2% Al) at 20 and 50° C. Experimental data compared with mechanical theories of creep.
(Q3, 3-66; CN, Al, Mg)

1336-Q.* Effect of Induction Hardening on Fatigue Strength. Hiroshi Nakamura, Tatsuo Amakasu and Shiro Ueda. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 475-479.

Influence of induction hardening on the fatigue limit of circular specimens of induction hardened, plain carbon steel containing 0.41% C. Adequate heating time gives maximum fatigue limit; proportional relations exist between fatigue limit and surface hardness; commercial criteria for optimum heating time exist. 8 ref. (Q7a, 2-64, J2g; CN)

1337-Q.* Study of Hydrogen Embrittlement of Iron by Internal-Friction Methods. R. E. Maringer, E. B. Swetnam, L. L. Marsh and G. K. Manning. *National Advisory Committee for Aeronautics TN 4328,* Sept. 1958, 62 p.

Effects of electrolytic charging on the properties of relatively pure Fe and tempered 4340 steel investigated metallographically and by observing internal friction behavior from −196 to 430° C. Electrolytic charging caused severe structural damage to both Fe and steel, consisting of blisters and internal

(*) Articles Available Through Photocopy Service; See Coupon, p. 91.

cracks. In Fe, cracks appeared to initiate grain boundaries and spread in a transgranular fashion. Removal of carbon by a wet-hydrogen anneal resulted in strictly intergranular cracking. Reverse-bend testing was used to demonstrate hydrogen embrittlement of these materials. 38 ref.
(Q26s, Q22; Fe-a, ST)

1338-Q. (English.) **Characteristics of Glide Caused by Stretching a Scratched Aluminum Single Crystal.** Tsien Ling-Chao and Ho Shaw-an. *Scientia Sinica,* v. 6, no. 2, 1957, p. 217-222.

At the start of plastic deformation, an artificial glide occurs earlier than ordinary slippage. Artificial glide can be used to study the effect of thin surface films on the process of gliding in the crystal, on the shear process near the grain boundaries in polycrystals, the influence of surface microscopic cracks on the strength of the crystal. (Q24; Al, 14-61)

1339-Q.* **Strength and Thermal Limitations of Materials for Airframe Components.** J. C. Ekvall. *Society of Automotive Engineers,* Preprint no. S109, 1958, 11 p.

Properties of presently available and advanced development Al, Mg, Ti alloys, low-alloy steel, corrosion resistant steels and Ni, Co and mixed-base alloys. Strength of each group is indicated for typical airframe components at various temperatures. Material-efficiency curves indicate thermal limitations in each case. 18 ref. (Q27a, 2-62, Q10a, T24a; Al, Mg, Ti, AY, SS, Ni, Co)

1340-Q.* (German.) **Influence of Temperature Upon the Elasticity Modulus of the Iron-Chromium Sigma Phase.** Karl Bungardt and Wolfgang Spyra. *Archiv für das Eisenhüttenwesen,* v. 29, Aug. 1958, p. 471-477.

Two Fe-Cr alloys with 45 and 41% Cr investigated as to their change in elasticity modulus, electric resistance and heat expansion with changing temperatures. Results are compared with the properties of an Fe-V alloy with 27% V and an Fe-Ni alloy with 74% Ni. The elasticity modulus of the Fe-Cr sigma phase decreases with decreasing temperatures and increases with rising temperatures. 21 ref. (Q21a, 2-61; SS)

1341-Q.* (German.) **Short-Time Fatigue Strength at Elevated Temperatures of Platinum Materials Between Room Temperature and 1250° C.** G. Reinacher. *Metall,* v. 12, July 1958, p. 622-628.

Platinum wires (2 mm. diameter) with 5% In, 5% Rh or 4% Pd were subjected to short-time fatigue tests between 20 and 1250° C. The influence on higher fatigue strength of the alloying components is imperceptible at 1250° C. Alloys with 5% In or Rh in the temperature range between 700 and 900° C. showed a fracture without deformation, while at 500 and 1250° C. ductile fractures with reduction of area were observed. 9 ref.
(Q7a, 2-62; Pt)

1342-Q.* (German.) **Hardening and Deformation of Gold Alloys.** E. Wagner. *Metall,* v. 12, July 1958, p. 628-630.

Investigations on a 14-karat jewelry alloy with 58.5% Au, 20% Ag and 21.5% Cu under the mutual influence of cold deformation and hardening showed properties like Al and Cu alloys. Diagrams for hardness as a function of rolling ratio and annealing time. (Q24, Q29n; Au-b)

1343-Q.* (German.) **Steels With 11 to 20% Chromium—Long-Time Brittleness Tests at 475° C.** Ewald Baerlecken and Heinz Fabritius. *Stahl und Eisen,* v. 78, Oct. 2, 1958, p. 1389-1395.

Literature review on the brittleness tendency of steels with 11 to 20% Cr. (Q26s, 2-62; ST, *Cr*)

1344-Q.* (Russian.) **Investigation of Impact Fatigue.** N. N. Davidenkov and E. I. Belyava. *Metallovedenie i Obrabotka Metallov,* v. 4, Sept. 1958, p. 12-15. (Henry Brutcher, Altadenda, Calif., Translation no. 4349.)

Study of fatigue strength limits under dynamic and static conditions. Study of 10^5 cycles showed that their magnitudes are dependent on the character of thermal treatment and consist of 0.80-0.90 for low temper and 1 for high temper. The less stable the condition of steel the lower are its fatigue limits. The size of the tested specimen has no effect on fatigue strength. (Q7; ST)

1345-Q.* (Russian.) **Some Properties of Iron-Copper Alloys Produced by Infiltration Process.** I. N. Frantsevich and O. K. Teodorovich. *Metallovedenie i Obrabotka Metallov,* v. 4, Sept. 1958, p. 20-23. (Henry Brutcher, Altadena, Calif., Translation no. 4351.)

Study of metallo-ceramic Fe and Cu-base alloys for machine building. With a 50% Cu content the mechanical properties of Cu-Fe alloys are determined primarily by the Cu-based phase. With a 25% Cu content, the Fe-based phase predominates, with a carcass structure with plasticized fillers. The strength characteristics are typical for those of single-phased Cu-Fe alloys. At high temperatures the Cu phase tends to extend into the Fe grain boundaries and to disintegrate its carcass structure. This process is accompanied by a drop in strength and an increase in plasticity. 10 ref.
(Q-general, M27d, H16e; Fe, Cu)

1346-Q.* (Russian.) **Properties of Surface Zone of Mechanically Worked Steel Containing Various Amounts of Carbide.** I. L. Mirkin and T. A. Sirenko. *Metallovedenie i Obrabotka Metallov,* v. 4, Sept. 1958, p. 29-33. (Henry Brutcher, Altadena, Calif., Translation no. 4354.)

The surface characteristics of structural steel worked with a mandrel differ considerably from those of original material. The strength of thin surface layer is twice that of original metal. The stress distribution in thin surface layers during metal working depends on the amount of cementite in steel. With the increase of hard and brittle carbide particles there is a decrease in strength and depth of the deformed surface. 6 ref. (Q25, Q24; ST)

1347-Q.* (Russian.) **Influence of Heat Treatment on Anisotropic Properties of Toolsteel Sheet.** E. I. Astrov. *Metallovedenie i Obrabotka Metallov,* v. 4, Sept. 1958, p. 33-38. (Henry Brutcher, Altadena, Calif., Translation no. 4355.)

Investigation of cold rolled sheet and plate steel specimens. As a result of heating to temperatures above critical point, the anisotropy of plate toolsteel is lowered by three times and the crystallographic anisotropy is lowered two times. After quenching in oil and annealing, as well as after gradual and isothermal quenching, the degree of anisotropy remains the same as that of normalized steel. 5 ref.
(Q24, 2-64; TS, 4-53)

1348-Q.* (Russian.) **Effect of Strain Hardening on Creep Characteristics of Austenitic Steels.** N. D. Sazonova. *Metallovedenie i Obrabotka Metallov,* v. 4, Sept. 1958, p. 46-49. (Henry Brutcher, Altadena, Calif., Translation no. 4358.)

Effect of degree of preliminary deformation at room temperature on creep characteristics. Three types of austenitic steels quenched in oil at 1180 and 1200° were used. Specimens were 200 mm. long, 10 mm. in diameter. By increasing the degree of cold hardening there is less elastic deformation, while the speed of creep formation increases. Preliminary deformation at room temperature increases resistance of metal to creep.
(Q3, 3-68; SS)

1349-Q.* **Found . . . a Low-Alloy Steel for Missiles.** William M. Stocker, Jr. *American Machinist,* v. 102, Aug. 25, 1958, p. 72, 73.

Produced in the annealed or "soft" condition for comparatively easy forming or cutting (equivalent to 4340), this material, when cooled in air and tempered, develops tensile strength levels in the 280,000-psi. range. Flat-rolled sheet provides a minimum of 5% elongation, transverse and longitudinal, in the full-hard condition. In general, the new steel attains this high strength level as a result of carefully balancing the alloying elements Si, Cr, Mo and V. It contains the minimum composition, including the lowest carbon content for good weldability, with no undissolved carbides. Notch sensitivity is extremely low.
(Q27a, T24e; AY, *Si, Cr, Mo, V*)

1350-Q.* **Titanium. Its Properties and Design Potentials.** H. E. Barkan. *Electrical Manufacturing,* v. 62, Oct. 1958, p. 100-109, 272, 274, 276, 278.

Current structural and electronic uses for Ti and its alloys. Potential uses based on exceptional properties in design of components and equipment. Properties of standard and new alloys, with fabrication data supported by charts and graphs. (Q-general, G-general, 17-51, 17-57; Ti-b)

1351-Q.* **Effect of Heating and Cooling on the Mechanical Properties of an Alloy Steel.** A. S. Kenneford and T. Williams. *Institution of Mechanical Engineers, Proceedings,* v. 171, no. 30, 1957, p. 823-828.

Alloy steel to specification B.S. En29 investigated. On rapid cooling from a temperature above the critical range the steel possessed poor mechanical properties (low yield and tensile strengths) at all temperatures down to the commencement of martensite formation at about 300° C., below which there was a sudden increase in yield and tensile strengths accompanied by a marked decrease in ductility. Relation between these mechanical properties and the incidence of cracking after repeated heating and rapid cooling.
(Q27a, Q23p, 2-64; AY)

1352-Q.* **Stress-Relaxation Behavior of Chromium-Molybdenum and Chromium - Molybdenum - Vanadium Bolting Materials.** J. A. Stafford and M. G. Gemmill. *Institution of Mechanical Engineers, Proceedings,* v. 171, no. 31, 1957, p. 834-842.

Tests on two steels to investigate essential differences between testing

under constant load, constant total strain, and a commonly used "weight bar" method that is intermediate between the two. Constant strain results do not entirely support the usual strain-hardening and time-hardening theories. Suggests how relaxation data may be used for design purposes.
(Q23a; AY, *Cr, Mo, V*)

1353-Q.* Study on the Changes of the Properties of Steel Caused by Low-Temperature Quenching. Pt. 4. Improvement of Notch Fatigue Strength. Tadakazu Sakura, Tadashi Kawasaki and Yukizumi Kita. *Japan Society of Mechanical Engineers, Bulletin,* v. 1, no. 2, 1958, p. 114-119.

The effect of low-temperature quenching. Increase in fatigue strength of steel is more notable in notched specimens than in unnotched. 14 ref. (Q7a, J26; ST)

1354-Q.* Microstructural Observation on Fatigue Fracture of Metals. Shigeo Owaku and Seinoshin Morikawa. *Japan Society of Mechanical Engineers, Bulletin,* v. 1, no. 2, 1958, p. 129-133.

Fatigue fracture, initially rough, becomes smooth under repeated stress; the metal dust produced is sintered, and in the case of high-carbon steel quench-hardened, under friction heat, into a very hard material. In this process, if air enters into the crack, the color of fracture surface will turn to black owing to the influence of friction heat; otherwise it would be white.
(Q7, Q26)

1355-Q.* Fatigue of Low Carbon Steel at Elevated Temperature. Toshio Nishihara, Shuji Taira, Kichinosuke Tanaka, Tyoichi Koterazawa and Yoshisato Azuma. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 445-452.

Tests made under the condition of constant deflection with a rotating-type machine at temperatures of 450, 300° C. and at room temperature by applying stress cycles in the range from 170 to 3000 cycles per min. At 450° C., frequency of repeated cycles has the following influence on fatigue life. Under a definite stress amplitude, the number of cycles to fracture is less at lower frequency and time to fracture has a definite value irrespective of frequency. (Q7a, 2-62; CN-g)

1356-Q.* Cumulative Fatigue Damage at Elevated Temperature. William K. Rey. *National Advisory Committee for Aeronautics, TN 4284,* Sept. 1958, 53 p.

Tests on heat treated SAE 4130 alloy steel. S-N curves at room temperature, 400 and 800° F. obtained. Results compared with theoretical analysis. 37 ref.
(Q7f; SS, 2-62)

1357-Q.* Rate of Fatigue-Crack Propagation in Two Aluminum Alloys. Arthur J. McEvily, Jr., and Walter Illg. *National Advisory Committee for Aeronautics, TN 4394,* Sept. 1958, 46 p.

Sheet specimens, 2 in. and 12 in. wide, of 2024-T3 and 7075-T6 Al alloys were tested in repeated tension with constant-amplitude loading. Stresses ranged up to 50,000 psi. based on the initial area. Good agreement between the results and predictions was found. 11 ref.
(Q26q, Q7; Al-b)

1358-Q.* A Phenomenological Theory for the Transient Creep of Metals at Elevated Temperatures. Elbridge Z. Stowell. *National Advisory Committee for Aeronautics, TN 4396,* Sept. 1958, 31 p.

Theory of high-temperature behavior of any metal is based on assumption that the metal exists in two phases, each with its own elasticity and viscosity. Experimental work on Al, gamma-iron, Pb and 7075-T6 Al alloy agrees with theory. 10 ref. (Q3; Fe, Al, Pb)

1359-Q.* Fatigue of Structural Materials at High Temperature. B. J. Lazan. *North Atlantic Treaty Organization, AGARD Rept. 156,* Nov. 1957, 27 p.

Engineering factors important in high-temperature fatigue tabulated. Effects of various environmental conditions are generalized when justified by prior work. Effects of mean stress, alternating stress, temperature and stress concentration. Nature and general significance of creep phenomena which occur under various combinations of cyclic stress and mean stress. Increasing importance of resonant vibrations as a cause for fatigue. Roles of damping, elasticity and conventional fatigue properties analyzed to provide criteria for judging resonance fatigue strength. Relative importance of these properties illustrated by examples 28 ref. (Q7, 2-62)

1360-Q.* Chromium Gives Stainless Properties to Iron-Aluminum Alloys. B. King, J. J. Mueller, N. N. Ida and F. G. Tate. *SAE Journal,* v. 66, Oct. 1958, p. 48-52.

Undesirable properties of Fe-Al alloys can be rectified by adding a sizable amount of Cr. This eliminates the superlattice as a source of difficulty. Cr also contributes corrosion resistance. Small quantities of other elements are also added to impart specific characteristics to the alloys. Ti, Si, Ta, Mo and Be are thought to promote high-temperature strength and good creep properties. (Q-general, 2-62, 2-60; Fe, *Al, Cr,* SGA-g)

1361-Q.* Scratch Hardness. Pt. 1. Relation to Cold Working. Tomiya Sutoki and Takeo Hikage. *Tohoku University, Science Reports of the Research Institutes,* v. 10A, no. 2, p. 85-96.

Scratch hardness was examined on polycrystals and single crystals of several metals. A law similar to Meyer's for indentation hardness held good between the load and scratch width. Change in scratch width with cold working was very small due to the heat evolved during scratching. Scratch hardness, contrary to Tammann's interpretation, is related to the annealed state rather than to the severely hardened state of a metal. 11 ref.
(Q29d, 3-68)

1362-Q.* Scratch Hardness. Pt. 2. X-Ray Investigation of Structural Change. Tomiya Sutoki and Koichi Nakajima. *Tohoku University, Science Reports of the Research Institutes,* v. 10, Aug. 1958, p. 269-275.

Structural change due to scratching or indenting Al and Ag studied by X-ray analysis. Scratch hardness appears to be related to the annealed state. (Q29d; Al, Ag)

1363-Q.* On Young's Modulus and Grain Size in Nickel-Copper Alloys. Yuki Shirakawa and Ken'ichi Numakura. *Tohoku University, Science Reports of the Research Institutes,* v. 10A, no. 2, 1958, p. 110-119.

Young's modulus and grain size were measured on ten types of polycrystalline ferromagnetic Ni-Cu alloys annealed at 700, 800, 900, 1000 and 1100° C. An empirical relation was found between Young's modulus E and the average area of crystal grains S. Young's modulus versus composition curves for alloys with the same grain size were not always similar to one another, but every curve showed a minimum.
(Q21a, M27c; Ni, Cu)

1364-Q.* Modes of Deformation Leading to Fracture of Metals: A Review of Progress to January 1958. R. Doldon and R. F. Lumb. *United Kingdom Atomic Energy Authority, IGRO-TN/C-919,* 1958, 7 p.

Certain crystals of polycrystalline super-purity Al specimens deformed in tension exhibit a banded slip surface. The stress axis of these crystals is <123>. Suitability of microradiography for investigating the effect of strain rate and temperature on the formation and initial propagation of cavities instigated by deformation. 14 ref.
(Q26, Q24; Al-a)

1365-Q. Iron-Aluminum-Base Alloys for Reactor Components. William A. Maxwell. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/707, 1958, 18 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Properties of experimental alloy containing 7.5% Al, 5% Cr, 1% Cb, ½% Ti and 86% Fe. Tensile tests indicate ample ductility for carrying out manufacturing operations incidental to fuel element fabrication. 9 ref.
(Q27a, T11g, 17-57; Fe, Al)

1366-Q. Tensile Properties of Pure Plutonium and Some Aluminum-Plutonium Alloys. H. R. Gardner, C. H. Bloomster and J. M. Jefferes. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1081, 1958, 9 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Objective was to determine mechanical and physical properties of cast fuel rods suitable for fuel elements. Ultimate strength, yield strength, modulus of elasticity, modulus of resilience, diamond pyramid hardness and density. Stress-strain relationships. (Q27a, T11g; Pu, Al-b)

1367-Q. Performance of Metals During Six Years Service in the Materials Testing Reactor. M. H. Bartz. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1878, 1958, 23 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

AISI Type 347 stainless steel, Al alloy 1100, Al alloy 356 and QMV Be as reactor core materials. Performance of fuel elements and control rods considered. (Q-general, 2-67; W11p, 17-57; SS, Al-b, Be)

1368-Q. Effects of Irradiation on the Structural Materials in Nuclear Power Reactors. J. C. Wilson. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1978, 1958, 26 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Tensile and notch-impact properties of a number of steels tabulated as a function of neutron dose and irradiation temperature. Sensitivity

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

to dose and irradiation temperatures varies in different steels whose nominal properties are similar in the absence of irradiation. 26 ref. (Q27a, Q6n, 2-67, W11p, 17-57; ST)

1369-Q.* (French.) **Note on the Modulus of Elasticity of Some Light Alloys.** Claude Mascre and Andre Lefebvre. *Fonderie,* no. 150, July 1958, p. 302-304.

LeRolland-Sorin elasticimeter was used to measure modulus of elasticity of Al-Cu, Al-Mg and Al-Si alloys. Al-Mg and Al-Cu specimens, regardless of analysis, had almost same modulus, but in Al-Si alloys this measurement increased with increase in Si content. Heat treating was found to have no appreciable influence on modulus of any of alloys studied, but modulus of chill-cast specimens was slightly higher than that of sand-cast. Study also confirmed indirectly absence of relationship between modulus of elasticity and other mechanical properties. (Q21a, 2-60, 2-64; Al-b)

1370-Q.* (German.) **"Contraction Work" in Rupture as a Characteristic of Materials.** L. Gillemot and G. Sinay. *Acta Technica,* v. 22, no. 1-2, 1958, p. 149-173.

Formula derived for the contraction work (i.e., work of volume unity at the reduced section in rupture). Contraction work of steel A60.11 computed as 41.0 mkg. per cc.; determined empirically as 47.3-51.0 mkg. per cc. Contraction work tests of CrV 135 steels, Sn-Zn alloys, Al-Si, Al-Fe, Al-Zn and Cu-Ni alloys. 6 ref. (Q26; SS-b, Sn-b, Al-b, Cu-b, Zn-b, Ni-b)

1371-Q.* (German.) **New Heat Resistant Pearlite-Ferrite Steels.** Karlheinz Werner. *Bergakademie,* v. 10, May-June 1958, p. 310-315.

Experiments on strength of heat resistant Cr, Mo and Cr-Mo steels, as influenced by service temperature. In testing for service temperatures up to 350° C., it is sufficient to determine the elastic limit or the 0.2% elongation; for the range 400 to 475° C., creep limit is found; for more than 500° C., the long-time strength and long-time elastic limit should be determined. 12 ref.
(Q-general, 2-61; SS, *Cr, Mo*)

1372-Q.* (German.) **Toughness of High-Speed Steels.** H. D. Weckener. *Industrieblatt,* v. 58, Sept. 1958, p. HT69-HT73.

Determination of toughness by measuring the ultimate deformation before fracture of the high speed steel class DMo5 (0.81% C, 4.11% Cr, 6.65% W, 2.01% V, 4.61% Mo). Toughness curve declines sharply. (Concluded.) 14 ref. (Q23r; TS-m)

1373-Q.* (German.) **Comparison Between Vickers and Knoop Hardness Testing Methods.** R. Chatterjee-Fischer and O. Schaaber. *Industrieblatt,* v. 58, Oct. 1958, p. HT80-HT82.

Advantages of rhombus-shaped Knoop-diamond: Small impression affects smaller zone in cross direction than square impression by Vickers diamond; important for hardness tests above cross-section of very thin layers. Determination of hardness requires only measurement of long diagonal; shifting of measuring head, with resulting loss of time, is superfluous. Sources of errors in reading measurements of diagonals are reduced since long diagonal in Knoop diamond is 2.8 times the size of Vickers' diagonal. (Q29c)

1374-Q.* (German.) **Importance of Tantalum Carbide in Hard Metal Production.** Miroslav Petrdlik and Vladimir Dufek. *Neue Hütte,* v. 3, Aug. 1958, p. 483-489.

Cutting capacity, flexural breaking strength, hardness, specific gravity, resistivity, resistance to oxidation and influence of type of TaC addition in base mixtures. 12 ref.
(Q-general, P-general, SGB-g, Ta, C)

1375-Q.* (German.) **Mutual Reaction Between Hardness and Modulus of Elasticity of Pure Metals at High Temperatures.** M. G. Losinski and S. G. Fedotow. *Neue Hütte,* v. 3, Aug. 1958, p. 489-494.

High-temperature properties of platinum, palladium, rhodium, iridium, tungsten, molybdenum, titanium, zirconium, iron, nickel, cobalt, copper and silver. 10 ref. (Q21a, Q29n; Pt, Pd, Rh, Ir, W, Mo, Ti, Zr, Fe, Ni, Co, Cu, Ag)

1376-Q.* (German.) **Fatigue Tests of Brazed Pipe Connections.** J. Colbus. *Schweissen und Schneiden,* v. 10, Aug. 1958, p. 312-316.

Fatigue tests of brazed joints on bicycle frames. Tubes were of cold drawn steel, 35 mm. with 1.5-mm. wall and 23.5-mm. with 1.1-mm. wall. Test apparatus consisted of high-frequency pulsator, optical dynameter and photo-electric amplitude regulator. Variation in strength of joints in different locations explained by variation in stress. Ag-brazed joints proved superior to Cu-brazed. 4 ref.
(Q7; ST, 7-52)

1377-Q.* (German.) **Influence of Temperature and Speed of Deformation on the Deformation Resistance of Some Steels.** V. Valorinta. *Werkstattstechnik und Maschinenbau,* v. 48, Aug. 1958, p. 452-456.

Deformation resistance decreases with increased deformation temperature and increases with the deformation speed. In the first case, a transitory sudden increase of deformation resistance was observed within the temperature range of recrystallization, the more accentuated the lower the deformation speed. 4 ref. (Q24, 2-61, 3-67; ST)

1378-Q.* (Italian.) **Size and Notch Effects in Fatigue Problems.** Antonio Erra. *Ingegneria Meccanica,* v. 7, June 1958, p. 41-46.

Size and notch effects in fatigue tests on both smooth and notched specimens described in light of published experimental results. Notch sensitivity of steels defined; factors which influence it. 12 ref.
(Q23s, Q7; ST)

1379-Q.* (Italian.) **Fatigue Tests Under Increasing Load on a Steel With Different Types of Surface Finish.** Ugo Rossetti. *Ingegneria Meccanica,* v. 7, June 1958, p. 47-56.

Rotary bending fatigue tests under increasing load in specimens of UNI 38 NCD 4 steel with five degrees of surface finish, roughness of which was measured in the longitudinal plane. Prot and Locati methods, as well as method of direct calculation for establishment of fatigue limits; results compared. Data obtained by tests analyzed statistically. Relationship between roughness and fatigue limit. 13 ref.
(Q7, S14; ST)

1380-Q.* (Italian.) **Comparison Between Degrees of Roughness of Metal Surfaces Finished by Different Methods and the Fatigue Limit of the Material.** Giovanni Perotti. *Ingegneria Meccanica,* v. 7, June 1958, p. 57-60.

Surfaces of specimens of UNI 38 NCD 4 steel were finished by hand polishing with emery cloth, finish turning on an engine lathe, grinding and shot-peening. Surface roughness was measured; all specimens were subjected to rotary bending fatigue tests. Two conclusions were: (1) in specimens of equal size and shape, the one having lesser surface roughness has greater fatigue resistance; (2) type of finish machining performed (i.e., whether chip removal is involved or not) and direction of marks left by finishing operation also influence fatigue limit. 9 ref. (Q7a, S14)

1381-Q.* (Italian.) **Fatigue Limit of Light Alloys.** Lamberto Mori. *Ingegneria Meccanica,* v. 7, June 1958, p. 63-72.

Review of dynamic characteristics of principal Al alloys suitable for plastic working. Specimen shape, size, surface finish and fatigue testing equipment used in rotary bending tests. Effect of notching on fatigue resistance and on degree of scatter of results and shape of fatigue curve. 10 ref. (Q7a; EG-a38)

1382-Q.* (Japanese.) **Studies on Sintered Aluminum Compacts.** G. Ito and F. Sawayanagi. *Scientific Research Institute, Reports, Komagome, Bunkyo-Ku, Tokyo, Japan,* v. 34, no. 4, 1958, p. 266-275.

Specific gravity, hardness, tensile strength, elongation, formability, microscopic tests and growing of crystals of sintered Al powder. Samples are made by Irmann's method. The finer the grain, the greater the hardness; best Vickers hardness is 72, tensile strength 24 kg. per sq. mm. If Cu (4%) and Mg (1%) are added, hardness is 122, tensile strength is 35 kg. per sq. mm. and elongation is 1%. (Q-general, Al, *Cu, Mg,* 6-72)

1383-Q.* **High-Temperature Metallurgy Today.** L. P. Jahnke and R. G. Frank. *Metal Progress,* v. 79, Nov. 1958, p. 77-82.

Surveys most promising areas for high-temperature development and gives the best alloys among the light metals and steels.
(Q24, Q-general, 2-62, 17-51; SGA-h)

1384-Q.* (English.) **Brittle Fracture. The Problem as it Exists Today.** G. M. Boyd. *Metalen,* v. 13, June 15, 1958, p. 200-205.

Brittle fracture in welded steel structures. Appearances and characteristics of brittle fracture. Work and energy relation in the initiation of propagation of brittle fracture. (To be continued.) 10 ref.
(Q26s; ST, 7-51)

1385-Q.* (English.) **Brittle Fracture. The Problem as it Exists Today. Pt. 2.** G. M. Boyd. *Metalen,* v. 13, June 30, 1958, p. 224-228.

Six prominent tests commonly used in assessing the transition range and fracture characteristics. Charpy, Tipper and Robertson test curves for mild steels showing variations in fracture behavior as indicated crystallinity and energy absorption. Effect of welding on brittle fracture. 4 ref.
(Q26s; ST, 7-51)

1386-Q.* (German.) **Creep Behavior of Aluminum at Temperatures up to 300° C.** K. Wellinger, E. Keil and G. Maier. *Aluminium,* v. 34, Aug. 1958, p. 458-463.

Creep tests were made on alloys Al 99.5 F7, AlMgSi 1 F32 and GK-Al-Si 10 Mg at temperatures up to 300° C. and times up to 10,000 hr. Extrapolation of the probable times to rupture for those loads which produce 1% permanent set in 10,000 hr. indicated that the time to failure for the same elongation varied widely with the alloy composition, heat treatment and temperature. Possibility of rapid test method.
(Q3m, 2-60, 2-61, 2-64; Al-b, *Mg, Si*)

1387-Q. High Temperature Metals. *Metal Industry,* v. 93, Oct. 10, 1958, p. 309-310.

Mechanical and physical properties, refractory metals and high-temperature techniques presented at a symposium on metals and alloys above 1200° C. at Oxford University.
(Q-general, P-general; 2-62, SGA-h)

1388-Q.* (Japanese.) Studies on Casting Stress. Pt. 2. Kenji Chijiiwa. *Japan Foundrymen's Society, Journal,* v. 30, July 1958, p. 531-535.

Casting stresses of ordinary inoculated and spheroidal cast irons compared using ring-shaped specimens with an arm across the diameter. Casting stresses were lowest for ordinary and highest for spheroidal cast irons. Castings with a boss in the center of the arm were used to investigate relation between ring and the castings stressed. The stresses became almost negligible when volume surface areas ratios of the ring and boss were equal.
(Q25, E25; CI, CI-r)

1389-Q. (Polish.) Investigations on Creep Phenomena Based on Tensile Tests. Jerzy Wantuchowski. *Archiwum Hutnictwa,* v. 3, no. 3, 1958, p. 201-226.

Creep tests under a constant load with a special apparatus. Relationship between true tension, ideal work hardening and velocity of deformation. (Q3)

1390-Q.* (Russian.) Influence of Thermo-Mechanical Treatment in Ladle on Impact Toughness of Structural Alloy Steel. E. N. Sokolkov, L. V. Smirnov and S. N. Petrova. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 276-280.

Study of industrial steel type 37XHZA and 35XGCA in shape of cross bar 20 × 20 × 200 mm. Heating to 1150° in ladle followed by 4-hr. annealing at 550° gives impact toughness of 10.7 and hardness of 30; heating to 1150° in ladle, quenching, annealing at 550° for 4 hr., gives impact toughness of 4.7 and hardness of 25. 4 ref.
(Q6, Q29, D9m, 2-64; AY)

1391-Q.* (Russian.) Influence of Cold Hardening and Aging on Resistance to Rupture and Plasticity of Steel at −196° C. E. M. Shevandin and R. E. Reshetnikova. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 293-303.

Investigation on polished as well as cut specimens of low-alloy steel 30 mm. thick in hot rolled condition. On none of the tested polished specimens was there any brittle fracture. By cold hardening, beginning with 10% and higher, resistance to rupture continuously rises. Subsequent aging of polished specimens lowers their resistance to rupture. Mechanical aging of cut specimens at 250° also lowers their resistance to rupture. This is accompanied by a lessening of contraction in both specimens. 16 ref.
(Q23, Q26s, 2-64, 3-68; AY)

1392-Q.* (Russian.) Characteristics of Gradual-Monotonic Process of Plastic Deformation of Steel I. L. G. Afendin. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 304-310.

Two-stage process of plastic deformation of structural steel at room temperature. The transition from one to another stage of plastic deformation does not alter the direction of the main axis of deformation. However, during monotonic transition the axial directions changed. In these changes there was observed an anisotropy in the mechanical properties. 6 ref.
(Q24, 3-72; ST)

1393-Q.* (Russian.) Influence of Heating Temperature on Mechanical Properties of Cast Iron With Spheroidal Graphite. S. G. Guterman and G. A. Pisarenko. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 311-314.

Effect of heating temperature on high-strength iron with redistributed phosphorus. Iron melted in induction furnace of 200-kg. capacity, and treated in ladle with 0.5% Mg. Increasing heating temperature to 950° leads to remarkable growth in plastic properties of iron and an even greater increase in its impact toughness. Increase above 950° does not result in any further changes. 6 ref.
(Q-general, E25q, 2-60; CI, *P, Mg*)

1394-Q.* (Russian.) Influence of Preliminary Cold Deformation on Creep. G. I. Nosova and V. M. Rosenberg. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 321-325.

Experiments conducted on alloys of Fe-Ni-Cr-Co with varying amounts of Co. Creep was tested by deformation bending. By simultaneous action of temperature and pressure, the strengthening of preliminarily deformed objects takes place much more rapidly then if only subjected to temperature increase. 6 ref.
(Q3, Q5, 2-61, 3-68, 3-74; Co, Cr, Fe Ni)

1395-Q. Diesel Engine Cylinder Bore Wear. Pt. 3. R. T. Rolfe. *Allen Engineering Review,* no. 39, Oct. 1958, p. 24-33.

Behavior of gray cast Fe with 2.5 to 4.5% C. (Q9, W11j; CI-n)

1396-Q. Brittle Failure of 5% Aluminum Bronze. A. C. Hamstead. *Industrial and Engineering Chemistry,* v. 50, Oct. 6, 1958, p. 87A-88A.

(Q26s; Cu-s, *Al*)

1397-Q. Mechanism of Wear in Repeated Friction. Toshio Sata. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 407-414.

(Q9)

1398-Q. (Japanese.) Secondary Stage Creep of Mild Steel. Toshio Nishihara, Shuji Taira, Kichinosuke Tanaka and Masateru Anami. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 424-433.

Calculations are made for 0.14% C steel. 25 ref. (Q3; CN)

1399-Q. Simple Determination of Creep Limit for Mild Steel. Toshio Nishihara, Shuji Taira, Kichinosuke Tanaka and Masateru Onami. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 434-440.

14 ref. (Q3; CN)

1400-Q. Effect of Stress Reduction on Secondary Creep of Mild Steel. Toshio Nishihara, Shuji Taira, Kichinosuke Tanaka and Kiyotsugu Ohji. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 441-445.

5 ref. (Q3, 3-66; CN)

1401-Q. Theory of Plastic Deformation of Metals at High Temperatures. Toshio Nishihara, Shuji Taira, Kichinosuke Tanka and Kiyotsugu Ohji. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 452-458.

(Q24, Q-62)

1402-Q. Deformation of Gray Cast Irons Under Combined Stresses. Masuji Uemura and Megumi Sunagawa. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 459-465.

Fracture tests on thin-walled tubes of gray cast irons under various ratios of combined tension and torsion. 8 ref. (Q26; CI-r)

1403-Q. Fracture of Metals. Pt. 3. Fracture of Gray Cast Iron Under Combined Stress. Masuji Uemura. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 466-471.

14 ref. (Q26; CI-n)

1404-Q. Tungsten Carbide and Steel Ball Indenters. Takeo Yoshizawa. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 503-510.

Use of tungsten carbide balls as indenters in Brinell and Rockwell hardness testing. 7 ref. (Q29)

1405-Q. Techniques for Surface Examination and Their Contribution to Our Knowledge of Friction and Wear. F. T. Barwell. *Lubrication Engineering,* v. 14, Sept. 1958, p. 391-397.

(Q9)

1406-Q. Aluminum Sand Castings. W. J. Reichenecker and D. K. Fox. *Materials in Design Engineering,* v. 48, Oct. 1958, p. 103-105.

Repeated impact and fatigue at high temperatures are analyzed for C4A, SC51A, ZG61A, SG70A and G10A alloys. Fatigue strength of these alloys is noticeably lower at 480° F. than at room temperature or 300° F. (Q6, Qy; Al, 5-60)

1407-Q. Friction and Wear With Reactive Gases at Temperatures up to 1200° F. Gordon P. Allen, Donald H. Buckley and Robert L. Johnson. *National Advisory Committee for Aeronautics* TN 4316, Sept. 1958, 26 p.

Boundary lubrication of metal surfaces with gases containing chlorine or sulphur studied from 75 up to 1200° F. 19 ref. (Q9)

1408-Q. X-Ray Diffraction of Ductile to Brittle Fracture. Masaki Watanabe, Kazuyoshi Kamachi and Yoshihiko Mukai. *Osaka University, Technology Reports,* v. 8, Mar. 1958, p. 113-124.

(Q26, M22g)

1409-Q. Variations in the Bending Strength of Steel Wire. Masayoshi Tagaya and Yoshiro Soyama. *Osaka University, Technology Reports,* v. 8, Mar. 1958, p. 125-129.

Variations of quenched wire (0.5 mm. diameter with 0.80% Mn and 0.64% C.) observed in relation to quenching and testing conditions. 7 ref. (Q5g; 4-61, ST)

1410-Q. Extra Fatigue Strength Is Now Available. W. S. Hyler. *SAE Journal,* v. 66, Oct. 1958, p. 40-41.

Substantial increases in fatigue

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

strength result from mechanical polishing of steels.
(Q7a; L10b; ST)

1411-Q. How to Get More From High Strength Steel. *Steel,* v. 143, Nov. 17, 1958, p. 128-129.

Substandard performance can be traced to rolling or forging, machining, heat treatment and finishes.
(Q7, J-general, F-22, G17, SS, SGB-a)

1412-Q. Internal Friction: a New Physical Quantity for the Study of Metals. T. Federighi. *Alluminio,* v. 25, no. 5, May 1956, p. 225-230. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1330.)

Previously abstracted from original. See item 642-Q, 1956. (Q22)

1413-Q. Erosion Wear of Metals and Protection by Coatings. A. V. Schreider. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p. 181-188. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB108.)
(Q9, 8)

1414-Q. Reagents for Evaluation of Susceptibility to Temper Brittleness in Steel. F. M. Del Corral and J. M. B. Castroy Mosquera. *Instituto del Hierro y Acero,* v. 9, Apr. 1956, p. 478-480. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)
(Q26s; ST)

1415-Q. Methods for Calculation of Primary Creep With Application to the Investigation of the Creep of Rotors. Y. N. Rabotnov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 5, 1957, p. 30-41. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-44K20R.)
(Q3n, T7h)

1416-Q. Study of Structural Changes in Nickel-Chromium Alloy During Creep. G. Ya. Kozyrskii. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 8, Aug. 1958, p. 90-92. (Henry Brutcher, Altadena, Calif., Translation no. 4402.)

X-ray study and micrographic analysis of an 80.2% Ni, 19.8% Cr alloy for changes in structure during creep. Data on total strain, creep rates during the different stages of creep and hardness as function of initial structure.
(Q3; Ni, *Cr*)

1417-Q. Effect of Columbium and Titanium on Properties of Stainless Steels. A. M. Samarin and A. A. Yaksevich. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 10, 1955, p. 107-116. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)
(Q-general, 2-60; SS, *Cb, Ti*)

1418-Q. Effect of Cold Reduction on Irreversible and Reversible Temper Brittleness. M. M. Shteinberg. *Metallovedenie i Obrabotka Metallov,* v. 2, no. 6, 1956, p. 26-35. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 869-Q, 1956.
(Q26s, 3-68; CN)

1419-Q. Laboratory Methods of Estimating Liability of Steel to Brittle Fracture. Y. M. Potak. *Zavodskaya Laboratoriya,* v. 22, no. 2, 1956, p. 208-217. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 356-Q, 1956.
(Q26s; ST)

1420-Q. Estimation of Ductility, Creep at Rupture and of Creep-Resisting Steels and Alloys at High Temperatures. A. V. Stanyukovich. *Zavodskaya Laboratoriya,* v. 23, no. 4, 1957, p. 476-484. (Henry Brutcher, Altadena, Calif., Translation no. 4232.)

Criterion adopted to index the ductility of various steels and alloys in long-time service at elevated temperatures. Effects of temperature and aging on creep behavior.
(Q23p, Q3, 2-62; ST, AY)

1421-Q. (German.) **Compression Strength and Corrosion Resistance of Cast Iron Containing Lamellar Graphite (Gray Iron).** A. Gabriel. *Industrie-Anzeiger,* v. 80, Sept. 12, 1958, p. 23-25.

6 ref. (Q28g, R-general; CI-n)

1422-Q. (Japanese.) **Wear.** M. Nakayama. *Metals,* v. 28, Oct. 1958, p. 731-735.
(Q9)

1423-Q. (Book.) **References on Fatigue.** 64 p. 1958. American Society for Testing Materials, STP no. 9-I, 1916 Race St., Philadelphia 3, Pa. $3.

Articles published in 1957 on fatigue of structures and materials; brief abstracts included. (Q7, 11-65)

1424-Q. Effect of Lubricant on Penetration of a Diamond-Point Indenter Into Ductile Metals. V. D. Kuznetsov and A. I. Loskutov. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 509-513. (Henry Brutcher, Altadena, Calif., Translation no. 4406.)
(Q29c; NM-h)

R Corrosion

631-R.* Reduction of Failures Caused by Corrosion in Pumping Wells. T. A. Bertness. *American Petroleum Institute, Proceedings,* v. 37, Sec. 4, 1957, p. 129-135.

Chemical inhibitors are of value in protecting subsurface equipment only to the extent that they can be placed where they are needed in the quantity and frequency required to do their job. Problems associated with the placement of inhibitors for protection of equipment from an environment of scale and corrosion in pumping wells. Effect of loads on the life of rods; histories of test equipment and well-treating methods. 7 ref.
(R7a, R10b)

632-R.* How Environment Directs Corrosion Control. Robert V. Jelinek. *Chemical Engineering,* v. 65, Sept. 22, 1958, p. 163-168.

Causes and nature of corrosion, influence of pH, oxidizing agents, liquid velocities and temperature. Control by inhibitors and cathodic protection. 20 ref.
(R-general, R10)

633-R.* Corrosion Resistance of Austenitic Nickel-Chromium Steel. W. Katz. *Draht (English Edition),* no. 36, Aug. 1958, p. 27-31.

Passivity and corrosion, effects of the alloy components, forms of corrosion and properties of austenitic steels in contact with various substances. 20 ref. (R-general; SS)

634-R.* Role of Hydrogen in the High-Temperature Corrosion of Zirconium and Its Alloys. Pt. 1. The Effect of Cathodic Polarization on Corrosion in Water at 325. J. N. Wanklyn and B. E. Hopkinson. *Journal of Applied Chemistry,* v. 8, Aug. 1958, p. 496-504.

Binary Zr alloys and Zircaloy 2 have been corroded in water at 325° C. with and without cathodic polarization. In some cases polarization can increase hydrogen uptake or reduce the protective character of the oxide films as assessed by capacity measurements. Alloying elements significantly influence both effects, but comparison of the alloys shows no systematic relation between their hydrogen uptakes and the loss of protective character of their films. Films formed in a previous period of unpolarized corrosion are damaged when polarized at 325° C. and at room temperature. 12 ref. (R4, 2-62; Zr-b)

635-R.* Pores and Pitting of Plated Deposits. J. M. Odkerhen. *Metal Finishing,* v. 56, Oct. 1958, p. 64-66.

Pores and pitting can be attributed to base material—porous base or poor mechanical pretreatment or occlusions in the material; chemical pretreatment; plating solution—suspended material or dissolved impurities. (R2j, L17c; 8-12)

636-R.* (Spanish.) **Nitroamines in the Protection of Iron Against Corrosion.** Mario Petit and Fernando Estalella. *Revista de Ciencia Aplicada,* v. 12, July-Aug. 1958, p. 293-298.

Ferrous metals wrapped in paper impregnated with nitrite of dicyclohexylamine or tri-ethanolamine in amounts in excess of 0.05 g. per sq. dm. effectively protected against oxidation produced by atmosphere saturated with water vapor at a temperature of 22±2° C. Procedures for preparing these corrosion inhibitors and their properties. 20 ref. (R10b, R10e; Fe, ST)

637-R.* Oxidation of Metals; Determination of Activation Energies. Per Kofstad. *Acta Chemica Scandinavica,* v. 12, no. 4, 1958, p. 701-707.

New method for determination of energies of activation of oxidation of metals and alloys. Metals are oxidized under conditions of linearly increasing temperature and the activation energy may be determined from one single oxidation run. In addition the method also gives the approximate temperature regions in which different rate laws of oxidation are found. Method has been applied to high-temperature oxidation of Ni, Zr, Cu and Ti. 18 ref.
(R1h, P13a; Ni, Zr, Cu, Ti)

638-R.* The Behavior of Zinc Coatings in Marine Conditions. *Corrosion Prevention and Control,* v. 5, Sept. 1958, p. 45-48, 74.

Coatings of Al, Cd, Pb, Sn, Zn, 88-12 Cd-Sn, and 88-12 Pb-Sn alloy were applied to mild steel specimens containing 0.2% C. After two years totally submerged in sea water all the Zn coatings were found to be intact; Al coatings applied by molten metal or wire pistols were almost intact; Cd behaved fairly well, but all the other coatings were unsatisfactory. (R4b; Zn, Al, Cd, 8)

639-R.* Castings Withstand Corrosion. *Iron Age,* v. 182, Oct. 16, 1958, p. 194-195.

Cast stainless alloys intended for

operation at temperatures below 900° F. They are used in chemical plants, oil refineries, textile and paper mills, sanitation, building construction and transportation. Chemistry of these alloys, suitable applications.
(R-general, 17-57, T29; SS)

640-R.* (French.) **Oxidation of Nickel by Ionic Bombardment.** J. J. Trillat, L. Tertian and N. Terao. *Cahiers de Physique*, no. 92, Apr. 1958, p. 161-162.

Thin film of Ni resting on support of NaCl was bombarded in electron diffractograph by ions from surrounding atmosphere; heating of specimen was avoided by sweeping ion beam. Bombardment provoked formation of a NiO oxide film oriented according to lattice of the metal, and progressively removed the surface layers of oxide thus formed without modifying their structure. Under conditions of experiment, appearance of Ni_3N does not occur, contrary to case of bombardment of thin film of Ni without supporting material. 7 ref.
(R1h, R2r; Ni)

641-R.* (French.) **Contribution to Study of Mechanism of Corrosion of Magnesium and Its Alloys.** Guy Bronoel. *Comptes Rendus*, no. 246, May 12, 1958, p. 2750-2753.

High-purity Mg and a Mg alloy containing 3% Al, 1% Zn, and 0.02, 0.016, 0.012 and 0.0006% Fe were studied. The potential/pH curves for electrodes in hydrochloric acid solutions were obtained. Experiments were made at 20, 30, 40 and 50° C. in the presence of air or under a nitrogen atmosphere. Comparative measurements were made without agitation and after violent agitation of the solution in the region next to the electrode.
(R6; Mg)

642-R.* (French.) **Interesting Properties of the General Electrical Field.** D. Petrocokino. *Corrosion et Anticorrosion*, v. 6, July-Aug. 1958, p. 241-251.

Mechanism of dissolution, thermodynamic and electrokinetic factors; modern theories on formation of metallic interface. Measurement of electrochemical potentials does not take into account phenomenon of double layer and gives only an interface potential with relation to solution. Concept of electric field created during corrosion process is presented as clew to understanding of inhibition of corrosion by means of artificial cathodic and anodic fields. 19 ref. (R1a, R10b)

643-R.* (French.) **Vapor Phase Inhibitors.** Giorgio Mantovani. *Corrosion et Anticorrosion*, v. 6, July-Aug. 1958, p. 258-264.

Types and properties of inhibitors. Results of accelerated corrosion tests on steel, Cu brass and Al in presence of SO_2 and in ordinary atmosphere. Temperature and surface condition (smoothness or roughness) of metal greatly influence amount of corrosion occurring on surfaces protected by vapor phase inhibitors. 34 ref. (R10b)

644-R. Corrosion and Creep Behavior of Tantalum in Flowing Sodium. Gilbert E. Raines, C. Vernon Weaver and John H. Stang. Battelle Memorial Institute. *U. S. Atomic Energy Commission*, BMI-1284, 24 p. Aug. 21, 1958. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.00.

Corrosion behavior of commercial Ta in high-purity flowing sodium from 700 to 1200° F. and the effect of sodium exposure on the creep strength of Ta at 1200° F. Tests were conducted in forced-convection flow loops constructed of Type 316 stainless steel. Corrosion tests yielded information about the partition of interstitials, particularly oxygen, in the sodium-tantalum system. 9 ref. (R6q, Q3; Ta)

645-R. Relation Between the Structure of a Magnesium Alloy and Its Tendency to Corrode Under Strain. M. A. Timonova. *Academy of Sciences of the USSR, Proceedings*, v. 115, (1957), p. 777-779. (Translation by Consultants Bureau, Inc.)

Al is principal component responsible for corrosion in Mg-Al-Zn-Mn system if in concentrations of over 2-3%. Corrosion of Mg alloys due to selective dissolution of supersaturated solid solution, or of Mg_4Al_3. (R1d; Mg-b, Al-b)

646-R.* (Japanese.) **Simple Method of Preventing Rusting of Iron Products.** Y. Yamamoto. *Metals*, v. 28, Sept. 1958, p. 659-662.

Complete protection is not possible but limited protection is provided by methods such as cleaning, moisture-removal by silica-gel, activated alumina etc., painting with $ZnCrO_4$ paint, asphalt paint, petrolatum-grease, rustproof petrolatum, spindle oil, rustproof grease, packing of $(C_6H_{10})_2NH_3HNO_2$, and plastic film lining.
(R10a, R10f, L26; Fe-b)

647-R.* (Rumanian.) **Contribution to the Study of Resistance to Corrosion of Nodular Graphite Castings.** Irina Cornea. *Studii si Cercetari de Metalurgie*, v. 1, Jan-June 1956, p. 37-48.

Tests on resistance to corrosion by hydrochloric acid of nodular graphite iron in comparison to gray iron. The hypothesis was that nodular graphite iron must have a better behavior than gray iron in non-oxidizing acids, because in the former the cathode surface—the graphite—is smaller than in the latter. When corrosion takes place with depolarization by hydrogen, the ratio between cathode and anode surfaces determines the rate of attack resistance to corrosion was almost double for nodular graphite iron than for gray pig iron. 5 ref.
(R6g; CI-r)

648-R.* (German.) **Painting and Long-Time Corrosion Testing of Steel.** Gerhard Becker. *Stahl und Eisen*, v. 78, Aug. 21, 1958, p. 1186-1191.

Nineteen steels were painted and exposed to an industrial atmosphere for 22 years. Si-killed steels with low Cu and Mo alloying components showed the best weather resistance. Paints on rimming steels were less durable than on Si-killed steels.
(R3n; ST, 8-70)

649-R.* (Japanese.) **Corrosion and Erosion of Screw Propellers.** M. Kanamori and S. Ueda. *Metals*, v. 28, Sept. 1958, p. 647-651.

Mn bronze and Ni-Al bronze are mainly used. Corrosion of screw propellers in sea water is caused by an electrolytic reaction in weak alkali solution in which O_2 is dissolved, and ionized Zn is removed from Mn bronze (or Al is removed from Ni-Al bronze). Cavitation erosion is caused by an impulse which is at most 200 kg. per sq. mm. Furthermore, screw exerts torque, friction and centrifugal force, which exert tension, bending, torsion and compressive stress, and hence mechanical strength is necessary. (R4b, T22h, 17-57; Cu-s)

650-R.* (Japanese.) **Sea Water as Industrial-Water; Cathodic Protection From Electrolytic Corrosion.** T. Otobe. *Metals*, v. 28, Sept. 1958, p. 652-658.

The screen for an inlet is almost completely protected by cathodic protection. Voltage is around 12 volts and current is 10 to about 20 amp. for a bar-screen and 20 to about 30 amp. for a rotary screen. An ordinary iron screen can be used as long as there is cathodic protection. A sea-water pump should be protected in the same way. Zn anode is located on mouthpiece of pump. A sea-water pipe is also protected, but if the radius of the pipe is less than 5 in. the method cannot be applied.
(R10d, R4b)

651-R.* (Japanese.) **Potential-pH Diagram for Corrosion.** T. Okamoto and S. Nagayama. *Metals*, v. 28, Sept. 1958, p. 665-673.

Corrosion of metal is considered to be an electrochemical reaction (i.e., oxidation and reduction by means of electron transfer). The reaction rate depends on concentration, pressure, and especially on electric potential. If equilibrium potential lies between the potential of hydrogen and of metal the reaction can occur, otherwise cannot. The change of Gibbs free energy is related with chemical potentials of the constituent elements and equilibrium potential of the reaction. From this equation, one can get a diagram of the potential versus pH.
(R1a)

652-R.* (Russian.) **Corrosion Cracking of Austenitic Steels at Elevated Temperatures and Pressures.** V. P. Sidorov and A. V. Ryabchenko. *Metallovedenie i Obrabotka Metallov*, June 1958, p. 25-32.

Corrosion resistance of austenitic steels was investigated in aqueous solutions under high pressures and temperatures. Steels exposed to the actions of distilled water with limited addition of oxygen for 500 hr. at 300° showed no corrosion cracks. Solutions of NaCl, Na_3PO_4, Na_2SO_4, Na_2HPO_4 and Na_2SO_3 produce no cracks in austenitic steels. Addition of the NaCl to basic solutions inhibit tendency toward cracking. Heat treatment does not affect corrosion resistance. 8 ref.
(R4, R6, 2-62, 3-74; SS)

653-R.* (Russian.) **Gaseous Corrosion of Titanium-Base Alloys Subjected to Furnace or Induction Heating.** V. A. Yakovlev and Ya. I. Spektor. *Metallovedenie i Obrabotka Metallov*, June 1958, p. 52-56. (Henry Brutcher, Altadena, Calif., Translation no. 4255.)

Corrosion in furnaces with moist air is more intensive than in those with air dried by high temperature. Corrosion in undried atmosphere rapidly rises at 700°. In induction heating to 1200° at the rate of 10-50° per sec. the depth of change in the surface layer is 5-6 times less than in furnace heating. Scale formation in induction heating is shifted upward about 200° when the rate of heating is increased. 4 ref.
(R7g; Ti)

654-R. Passivity During the Oxidation of Silicon at Elevated Temperatures. Carl Wagner. *Journal of Applied Physics*, v. 29, Sept. 1958, p. 1295-1297.

(R1h; Si)

655-R. Sulphuric Acid Corrosion of Stainless Steels. *Industrial and Engi-*

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

neering Chemistry, v. 50, Sept. 1958, Pt. 1, 85A-86A.
(R6g; SS)

656-R. Precipitation of FeO in Scales Formed by Oxidation of Iron at High Temperatures. J. Paidassi. *Acta Metallurgica,* v. 3, no. 5, Sept. 1955, p. 447-451. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB66.)

Previously abstracted from original. See item 8-R, 1956. (R1h; Fe)

657-R. Corrosion by Sulphuric Acid. Y. Bunger. *Werkstoffe und Korrosion,* v. 6, June 1956, p. 322-330. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1484.)

Previously abstracted from original. See item 390-R, 1956. (R6g, AY)

658-R. Studies of Structure and Adhesion of Scale on Plain Carbon Steel Plates. H. J. Engell and F. K. Peters. *Archiv für das Eisenhüttenwesen,* v. 28, no. 9, 1957, p. 567-574. (Henry Brutcher, Altadena, Calif., Translation no. 4329.)

Previously abstracted from original. See item 161-R, 1958.
(R2q, M28; CN, 4-53)

659-R.* (French.) **Formation of White Rust.** A. Herz. *Metallurgie et la Construction Mecanique,* v. 90, July 1958, p. 559-561.

Composition of white rust on Zn, conditions under which it is formed, influence of temperature and humidity; protection by passivation, grease films, flexible paints.
(R1h, R10; Zn)

660-R.* (Serbian.) **Stress-Corrosion Cracking of Austenitic Stainless Steels in Magnesium Chloride Aqueous Solution.** T. P. Hoar and J. G. Hines. *Zastita Materijala,* v. 5, no. 4, 1957, p. 127-137.

Electrochemical behavior of 18-8 stainless steel wire stressed in a hot concentrated $MgCl_2$ solution depends on magnitude of applied stress, temperature, composition of steel and thermal treatment. Cathodic protection gives good results. (R1d, 2-62, R6g; SS-e)

661-R.* (French.) **Protection of Light Metal Assemblies in Aircraft Construction.** Paul Roussetbert. *Corrosion et Anticorrosion,* v. 6, Sept. 1958, p. 272-287.

Cathodic protection (cladding), chemical oxidation, anodic oxidation and organic coatings as applied to wing and fuselage assemblies, homogeneous or heterogeneous, either riveted, welded or bolted. Role of each type of protection; principles and description of processes.
(R10, L-general, T24; EG-a39)

662-R.* (French.) **Protection of Steel Against Underground Corrosion.** Kurt F. Tragardh. *Corrosion et Anticorrosion,* v. 6, Sept. 1958, p. 292-297.

Study of corrosion of buried steel framework in Swedish electrical power supply system. For mildly aggressive soils, hot dip galvanizing provides adequate protection. For highly corrosive soils, extra thickness of steel (1, 2 or 3 mm., depending on nature of soil) is recommended in addition to galvanizing.
(R8, L16; ST, *Zn*)

663-R.* (French.) **Statistical Study of a Case of Corrosion.** Cl. Meyer. *Corrosion et Anticorrosion,* v. 6, Sept. 1958, p. 298-317.

Corrosion of bottom of steel reservoir for hydrocarbons which was being retired from service. Purpose was to determine extra thickness of bottom plate to allow for replacement reservoir. Problem was handled by method of "population sampling" and statistical analysis. 7 ref. (R7g, S12; ST)

664-R. (Russian.) **Trials of Stainless Steel for Use in Injection Needles.** A. T. Nesterenko. *Meditsinskaya Promyshlennost SSSR,* no. 4, 1957, p. 13-18.

Stainless steels studied were 1 Kh. 18N9, 2 Kh. 18N9, 2 Kh. 18NGT, 2 Kh. 18N8V4, 2 Kh. 13n8G4, 2 Kh. 13N4G9 and 2 Kh. 13G16. To determine the mechanical properties and capacity for cold working, steels were drawn with reduction of 10, 20 and 30%. Needles were boiled in water for one day (8 hr. boiling, 16 hr. held on a grid in steam) to determine corrosion resistance. Steel 2 Kh. 18N8V4 gives evidence of possessing superior mechanical and corrosion resistant properties.
(R4, T10e, 17-57; SS)

665-R.* A Nondestructive Test for Intergranular Corrosion in Stainless Steel. R. C. Robinson. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM, STP no. 223, 1958, p. 112-118.

Variations in resistivity of sound and corroded samples of tubing allow accurate determination of extent of corrosion.
(R2h, R11, S13h; SS)

666-R.* Development of Oxidation-Resistant Niobium Alloys. Harry P. Kling. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 87-91.

Samples of Cb and Cb alloyed with V, Mo or Ti were oxidized in air at elevated temperatures. Results of microscopic, chemical and electrical conductivity studies on oxide scale form basis for discussion of oxidation rate and mechanism. 6 ref. (R1h; Cb-b)

667-R.* Preliminary Study of the Effect of Binary Alloy Additions on the Oxidation Resistance of Columbium. Francis J. Clauss and Charles A. Barrett. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 92-97.

Addition elements, Ti, V, Cr, Zr, Mo, Ta, W, Fe, Co, Ni, Ir, Al, Si, Cu, Ge, Se and Re were added singly in 1, 2, 3, 5, 10 and 25 at. % and specimens were fabricated by powder metallurgy. Nature of scale and resistance to oxidation were evaluated by continuous exposure to dried air for 4 hr. at 1000° C. and 2 hr. at 1200° C. (R1h, 2-60; Cb-b)

668-R.* Oxidation of Columbium-Chromium Alloys at Elevated Temperatures. Charles A. Barrett and Francis J. Clauss. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 98-105.

Oxidation rates and scale characteristics were determined for Cb alloys containing 0.8 to 11.6 % Cr at 800, 1000 and 1200° C. At 800° C., optimum Cr concentration for soundest scale and lowest oxidation rate was found at 5 to 8%. At 1000° C., scale characteristics and oxidation resistance improved with increasing Cr. At 1200° C., Cr had no appreciable effect in range studied. 12 ref.
(R1h, 2-62; Cb-b, *Cr*)

669-R.* (German.) **Chemical and Electrochemical Aspects of Corrosion in Atomic Piles.** G. H. Cartledge. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 493-503.

Formation of metal-protective film-solution under normal conditions; corrosion reactions caused by the products of nuclear fission. 44 ref. (R1, T11g, 2-67)

670-R.* (German.) **Corrosion and Passivity.** U. F. Franck. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 504-513.

Corrosion processes and passivity in metallic materials are of electrochemical nature. It is possible to show that the passive state is caused by very thin nonmetallic films. These films are characterized by certain properties of electric conductivity. Corrosion behavior of passivated metals is governed by the chemical and electric properties of the films and not by the basic metal. 63 ref. (R10c)

671-R.* (German.) **Protection Against Corrosion.** K. Thalhofer. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 515-517.

Construction of modern cathodic protection installations for old pipelines (water, gas) in densely populated as well as in industrial districts is meeting increasing difficulties. The number of buried pipes makes it necessary to extend the protective installations. (R10d, W13h)

672-R.* (German.) **Intercrystalline Corrosion of Chromium-Nickel Steels.** M. Prazak. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 517-519.

Electrical etching test using saturated calomel electrode for determining passivation potential of grain boundaries. 12 ref.
(R2h, 1-54; SS)

673-R.* (German.) **Corrosion of Lead Pipes.** E. L. Schmeling and B. Roeschenbleck. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 529-532.

Pitting of waste water pipes made of Pb always shows identical characteristics. Areas around corroded spots are covered with lead sulphide and basic carbonate. Current density-voltage curves were plotted under various conditions; corrosion potential and corrosion current determined. 8 ref.
(R1a, R2j; R4; W13h, Pb)

674-R.* (German.) **Corrosion of Aluminum and Its Alloys.** O. Sverepa. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 533-536.

In river waters corrosion was low and uniform, while there was pitting corrosion in circulating waters. Composition and impurities in the water influence corrosion. Differences between the corrosion behavior of different materials were slight. Al-Mn and Al-Mg alloys were most severely corroded by mutual action of Cu^{++}, Cl', Ca^{++}, HCO_3' in presence of oxygen. Pitting corrosion depends largely on concentration of the ions mentioned.
(R4, R2j; Al)

675-R.* (German.) **Passivation of Zinc.** L. Cerveny. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 543-547.

An effective passivating agent is the vapor of tertiary butanol chromate. A temporary action passivates the metal and decreases the velocity of corrosion. Resistance to corrosion depends on duration of

the action of the passivating agent. In the reaction between Zn and the vapors of tertiary butanol chromate, the partial pressure of the air determines velocity of passivation. 6 ref. (R10c; Zn)

676-R.* (German.) **Influence of Dust on the Atmospheric Corrosion of Metals.** K. Barton. *Werkstoffe und Korrosion*, v. 9, Aug-Sept. 1958, p. 547-549.

Properties of several natural and artificial dusts which may influence corrosion processes. Absorption capacity for water vapor and sulphur dioxide and influence of soluble components; composition of dusts and their pH-value. Corrosion tests on unprotected steels, Cu, Zn and Al in presence and absence of sulphur dioxide at different humidities were carried out in presence of dust. (R3, R11)

677-R.* (German.) **Measurement of Intercrystalline Corrosion by Resonance Vibration.** K. Smrcek. *Werkstoffe und Korrosion*, v. 9, Aug-Sept. 1958, p. 550-552.

A specimen showing intercrystalline corrosion is subjected to the vibrations of a magnetic exitor which is fed by an amplified vibration generator. When the frequency of resonance changes according to the degree of corrosive attack, the sound of the specimens changes; this point is also indicated by means of silicon carbide powder which is gathered in the nodal point. (R2h, R11a)

678-R.* (German.) **Diagnosis of the Causes of Corrosion Processes.** G. Schikorr. *Werkstoffe und Korrosion*, v. 9, Aug-Sept. 1958, p. 552-556.

Composition, distribution, color, velocity of dissolution and crystal structure of the corrosion products may indicate the causes of corrosion. Some diagnoses are reliable, others are reliable only under certain conditions. 6 ref. (R-general, R11)

679-R. (Hungarian.) **Lead Alloys for Batteries.** Pesti Laszlo. *Kohaszati Lapok*, v. 12, no. 1-2, 1957, p. 53-57.

The Pb-Sb (6-12% Sb) alloy is not satisfactory because Sb dissolves in H_2SO_4. The replacement of Sb by Cd deserves attention. A Pb alloy with 2% Sb and 1% Cd gives good results. Addition of 0.05-0.1% Te increases strength and corrosion resistance of Pb. Li, 3 or 1%, in combination with K, Na or Rb, also increases the hardness. An alloy containing 0.02% Li, 0.3% Na, 0.05% Ca has tensile strength of 20 kg. per sq. mm. and possesses good corrosion resistance. Beneficial action of As and Ag noted. (R6g, Q27a, Q29n, 2-60, T1; Pb)

680-R.* (Japanese.) **Metal Surfaces and Corrosion.** N. Ohtani. *Metals*, v. 28, Oct. 1958, p. 736-740.

Corrosion is more or less influenced by the valence electrons of metals. Irregularity on the surface induces a local polarization which may accelerate corrosion; polarization potential and hydrogen overvoltage are the most important factors. Impurities and scratches cause most corrosion. (R-general)

681-R.* (Japanese.) **Underground Corrosion and Its Prevention.** H. Okubo. *Metals*, v. 28, Oct. 1958, p. 782-784.

Corrosion is caused by electrolytic reaction. If the specific resistivity of soil is less than 2300, corrosion is more serious. This kind of corrosion is caused by local electric current which depends on the nonuniformity of the surface, contact of two different metals, nonuniformity of soil and bacteria. Protection may be provided by plating with glass coating, enameling, plastic coating and cathodic protection. (R8)

682-R. How Oxidative Corrosion Occurs. Robert V. Jelinek. *Chemical Engineering*, v. 65, Aug. 25, 1958, p. 125-130.

Principles of electrochemical corrosion. (R1a)

683-R. Compound Inhibits the Formation of Tenacious Scale. *Design Engineering*, v. 4, Sept. 1958, p. 63.

New compound inhibiting formation of tenacious scale on stainless steel, Ni-Cr and alloys of Co, Ti and Cu during heat treatment. (R10b, R2q; SS)

684-R. Protection of Iron by Rust Stabilization. *Industrial Finishing (London)*, v. 10, Sept. 1958, p. 47.

By converting rust to stable oxides of iron, "Corroless" provides a priming coat which can be applied direct to the metal without any elaborate cleaning procedure. (L26n, R1h, R2q, R10g; Fe)

685-R. (Japanese.) **Pinholes in Aluminum Pots.** T. Fukushima. *Metals*, v. 28, Sept. 1958, p. 663-664.

Pinholes result when low pH water is boiled, or chloride or sulphide is contained in water. Almite film is a good protector, but thick film is required. (R2j, T10a; Al-b)

686-R. Behavior of Some Aluminum Alloys in a Chromic-Phosphoric Acid Mixture. K. M. Carlsen. *Aluminium*, v. 33, Feb. 1957, p. 101-103. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1504.)

Previously abstracted from original. See item 145-R, 1957. (R6g; Al)

687-R. Selective Corrosion of Zinc. I. I. Zabolotnyi. *Journal of Applied Chemistry of the USSR*, v. 30, (1957), p. 1007-1011. (Translation by Consultants Bureau, Inc.)

Dependence of the selective corrosion of Zn on acid content of the solution, temperature and presence of various oxidants in solutions on nonoxidizing acids. (R6g; Zn)

688-R. On the Oxidation of Titanium. W. Kinna and W. Knorr. *Zeitschrift für Metallkunde*, v. 47, Aug. 1956, p. 594-598. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB15.)

Previously abstracted from original. See item 471-R, 1956. (R1h; Ti)

689-R. (Slovenian.) **Some Data Concerning Corrosion of Chemically Stable and Heat Resisting Steels.** Otmar Gautsch. *Nova Proizvodnja*, v. 8, no. 3-4, 1957, p. 217-221.

Corrosion in salt and fresh water and at some temperatures under various conditions. Influence of heat treatment and alloying on corrosion resistance; connection between steel potential and corrosion resistance. Data on scale formation on heat resisting steels. (R4a, R4b; ST, SGA-h)

690-R. Oxidation of Copper to Cu_2O + CuO. Donald W. Bridges, John P. Baur, Gretta S. Baur and W. Martin Fassell, Jr. Utah University, Dept. of Metallurgy. *U. S. Office of Technical Services*, PB 126194, Nov. 1955, 17 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.40; Photostats $3.30.)

Oxygen-free high-conductivity Cu was oxidized to CuO and Cu_2O over the temperature range 600-1000° C. in pure oxygen (0.026-20.4 atm.). Correlation of weight gained and time, also temperature correlation, obtained by mathematical equations. (R1h; Cu)

691-R. Study of Fundamental Factors Affecting Corrosion of Magnesium Alloys and Adhesion and Protective Effect of Coatings. S. E. Rohowetz. Bjorksten Research Laboratories, Inc. *U. S. Office of Technical Services*, PB 132153, May 1956, 127 p. (Available at Library of Congress, Washington, D. C.—Microfilm $6.30; Photostats $19.80.)

Causes of pitting-type corrosion. (R2j; Mg-b)

692-R.* (Czech.) **Corrosion Observed in Weldments of Stainless and Heat Resistant Steels.** Josef Nemec. *Zvaranie*, v. 7, July 1958, p. 193-196.

"Knife-cut" corrosion occurs with stabilized 18-8 steels, near the contact line between weld and base metal. Observed under boiling HNO_3, HNO_3 solutions and NaF. Favored by more than 0.08-0.10% C in steel; Ni near upper limit, Cr and Ti or Cb near lower limits; coarse grain at contact line. Reduced by increased Ti or Cb; several welded layers not exposing contact line. Stress-corrosion avoided by choice of steels and relief annealing. Slag from coated electrodes causes corrosion by passing atmospheric O and S to the metal and should be removed by sandblast. 7 ref. (R-general; SS, 7-51)

693-R.* (German.) **Attack of Iron-Saturated Zinc Melts Upon Iron Which Contains Molybdenum.** Dietrich Horstmann. *Archiv für das Eisenhüttenwesen*, v. 29, Aug. 1958, p. 463-466.

During the attack of Zn melts upon Fe containing up to 5.25% Mo, the Fe losses and the formation of layers of Fe-Zn alloys are observed in terms of time and temperature. At lower Mo contents the attack upon the Fe is strong, and decreases with Mo content up to 5%. At low and high temperatures the time diagram has parabolic shape; in the intermediate range it is linear. (R6m; Fe, *Zn, Mo*)

694-R.* (German.) **Mechanism of Passivation and Formation of Protective Layers.** Theo Hermann. *Archiv für das Eisenhüttenswen*, v. 29, Aug. 1958, p. 505-512.

Survey of research in the field of passivation; discussion of layers, electrochemical and other measuring methods. The mechanism of formation and decomposition of passive layers on Fe, Ni, Cr, Al and Ti as well as the behavior of Fe-Cr alloys and Cr steels. 33 ref. (R10c; Fe, Ni, Cr, Al, Ti, AY)

695-R.* (German.) **Resistance to Welding and the Oxidation Behavior of Contact Points Made From Silver-Graphite.** A. Keil and W. Merl. *Metall*, v. 12, July 1958, p. 619-622.

Oxidation behavior of silver-graphite materials is largely dependent on the graphite contents. Doubling the graphite content increases the rate of destruction through burning 10 to 12 times. Therefore, this material is suitable only on bounce-free switch gear. Through double sintering the life of contact points was increased by 100% and more without reducing the resistance against welding. 7 ref. (R1h; Ag, NM-k36, SGA-r)

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

696-R.* **Corrosion of Titanium in Sulfuric Acid and Chlorine.** L. W. Gleekman. *Corrosion,* v. 14, Sept. 1958, p. 21-22.

Tests find suitable materials of construction to handle both chlorine gas being dried by sulphuric acid, and sulphuric acid saturated with chlorine. Passivating effect of chlorine in presence of water is apparent mechanism which retards corrosion of Ti in sulphuric acid. (R6g, R6q; Ti)

697-R.* **A Review of the Gas Condensate Well Corrosion Problem.** D. R. Fincher. *Corrosion,* v. 14, Sept. 1958, p. 23-24.

Corrosion control in wells with shut-in pressure above 5000 psi. Methods of applying inhibitors in wells include sticks, liquid lubricators, chemical pumps and pump trucks, dump bailers, chemical injection valves in tubing, bottom hole chemical pumps, bottom hole chemical injectors, chemical squeezes. 9 ref. (R10b, T28)

698-R.* **Corrosion Resistance of Titanium Alloys Compared With Commercially Pure Titanium.** David Schlain and Charles B. Kenahan. *Corrosion,* v. 14, Sept. 1958, p. 25-28.

Ti alloys are similar to commercially pure Ti in chemical and galvanic corrosion properties, and have low corrosion rates. They resist synthetic ocean water, tap water, sodium hydroxide (1%) and ferric chloride (5%) solutions. In aerated sulphuric acid solutions, Ti alloys, except Ti-Cu, are corrosion resistant and vary with temperature and concentration of acid; Ti-Cu alloys are more resistant in sulphuric and less resistant in hydrochloric acid. 7 ref. (R4, R6; Ti-b, Ti-a)

699-R. **Effect of the Concentration of Various Salts on the Dissolution of Cadmium in Air-Saturated Solutions.** Charles J. Boone and Cecil C. Lynch. *Corrosion,* v. 14, Sept. 1958, p. 29-31.

Initial dissolution rate of Cd in varying concentrations of potassium, sodium and barium chloride, potassium and sodium bromide, potassium and sodium iodide, and sodium and barium perchlorate examined polarographically. Nature of anion had much greater effect on rate than did the nature of cation. Inhibiting action by perchlorate ion and fast corrosion rate of iodide salts are due to anion polarization. 18 ref. (R6j; Cd)

700-R.* **Corrosion Behavior of Zirconium-Uranium Alloys in High-Temperature Water.** Warren E. Berry and Robert S. Peoples. *Corrosion,* v. 14, Sept. 1958, p. 34-38.

Corrosion increased with increase in water temperature, and oxygen and uranium content. Corrosion behavior determined by amount and distribution of epsilon phase in alloys less than 55% U and alpha phase in alloys greater than 60% U. Increase in corrosion rate in alloys of 45 to 55% U can be correlated with the effect of oxygen on the stability of epsilon phase. Microstructures reveal increase of second phase (alpha Zr) with increasing oxygen content. 13 ref. (R4, 2-61, 3-71; Zr-b, U)

701-R.* **Corrosion and Water Purity Control for the Army Package Power Reactor.** Richard J. Clark and A. Louis Medin. *Corrosion,* v. 14, Sept. 1958, p. 39-43.

Reactor produces 2000 kw. of electricity, and has a pressurized water system. Primary purification system performance data on individual components. Experimental in-plant equipment for determining crude levels, corrosion rates and other related parameters. Corrosion rate of components has been lower than originally estimated. 4 ref. (R4, T11, W11p)

702-R.* **Some Relations Between Deposition and Corrosion Contamination in Low Make-Up Systems for Steam Power Plants.** E. S. Johnson and H. Kehmna. *Corrosion,* v. 14, Sept. 1958, p. 49-54.

Mechanism is postulated which indicates that ratios and interactions of contaminants are more significant to deposition than the absolute amount of contaminants. Examples cited. Mechanisms based upon thermodynamics of soluble ions from corrosion of materials of construction can qualitatively account for form and composition of deposits. Trouble from deposits depends on ratio of Cu to Fe rather than the absolute concentrations of either. Small variations in the concentration of other ions are not important. 3 ref. (R4, W11g)

703-R.* **Corrosion of Metals in Tropical Environments. Pt. 2. Atmospheric Corrosion of Ten Structural Steels.** C. R. Southwell, B. W. Forgeson and A. L. Alexander. *Corrosion,* v. 14, Sept. 1958, p. 55-59.

Tests made by exposure to seashore and inland environments in Panama Canal Zone. Corrosion rates compared with existing data for the same materials in temperate zones. Effects of low-alloy additions on mild carbon steel. Ni and Cr steels were most corrosion resistant, while Cu steel proved slightly better than unalloyed mild steel. Low-alloy steels showed good corrosion resistance. 9 ref. (R3s; AY)

704-R.* **Electrochemical Behavior of Aluminum.** E. Deltombe and M. Pourbaix. *Corrosion,* v. 14, Nov. 1958, p. 496t-500t.

Potential-pH equilibrium diagram of the system aluminum-water at 25° C. was developed from the standard free energies of the constituents and the general electrochemical behavior of Al was deduced from the diagram. Diagram indicates the theoretical circumstances in which Al should show corrosion, immunity, and passivity, under the hypothesis that the passivation results from the formation of a film oxide whose stability resembles that of hydrargillite. 29 ref. (R11m; Al)

705-R.* **Corrosion-Resistant Experimental Steels for Marine Applications.** C. P. Larrabee. *Corrosion,* v. 14, Nov. 1958, p. 501t-504t.

Six steels having various combinations of Ni, Cu and P tested in sea water for periods of 1, 2 and 5 years and compared with corrosion resistance of structural carbon steel. Decreases in thickness were calculated at 20 different levels for each of the Ni-Cu-P steels. Steel containing 0.5% Ni, 0.5% Cu and 0.12% P had the greatest resistance. (R4b, 2-60; AY, *Ni, Cu, P*)

706-R.* **Laboratory and Field Methods for Quantitative Study of Sulfide Corrosion Cracking.** J. P. Fraser, G. G. Eldredge and R. S. Treseder. *Corrosion,* v. 14, Nov. 1958, p. 517t-532t.

Test apparatus and procedures for studying sulphide corrosion cracking may have general applications in the broader field of stress-corrosion cracking. A quantitative means of expressing the relative susceptibility to cracking of a specific alloy in a specific environment may be obtained. Influence of a number of test variables such as stress raisers, composition of test solution, time of exposure and type of loading on the "critical strain" determination. 9 ref. (R1d, R7k; SS)

707-R.* **Influence of Metallurgical Variables on Resistance of Steels to Sulfide Corrosion Cracking.** J. P. Fraser and G. G. Eldredge. *Corrosion,* v. 14, Nov. 1958, p. 524t-530t.

Statistical study of sulphide corrosion cracking as a function of chemical composition, mechanical properties and heat treatment. Of 104 alloy steels studied, 79 were commercially produced API grades J-55, N-80 and P-110 steels. Resistance to cracking is increased most rapidly by increases in ductility and in carbon content. Resistance to cracking is decreased most rapidly by increases in hardness, strength and Mn and Mo content. 9 ref. (R7k; AY)

708-R.* **Limitations on Chemical Means of Controlling Corrosion in Boilers.** Douglas E. Noll. *Corrosion,* v. 14, Nov. 1958, p. 541t-544t.

Five examples of boiler tube failures caused by corrosion. Iron migration theory. Corrosion can occur despite the use of chemicals in boiler water. Two chemical methods of corrosion control are control of alkalinity and acid cleaning. Under certain operating conditions periodic acid cleaning of boilers is essential if tube failures are to be avoided. 21 ref. (R4c, R10a; ST)

709-R.* **Corrosive Influences Peculiar to Sewage.** A. G. Arend. *Corrosion Prevention & Control,* v. 5, Aug. 1958, p. 41-42.

Corrosion in sewage pipe lines differs from corrosion in normal water, which contains more oxygen than sewage. Deposits which accumulate on metal surfaces in contact with sewage give no protection. Compounds of chlorine, sulphur and ammonia present in sewage destroy brickwork, concrete and iron. Ventilation facilitates removal of gases and speedy conveyance of sewage helps to prevent corrosion. (R4j)

710-R.* **Effect of Surface Active Agents on the Formation of Boiler Scale.** G. H. Ireland. *Corrosion Prevention & Control,* v. 5, Oct. 1958, p. 57-60.

Mechanism suggested for the formation of the common calcite and anhydrite scales frequently found on heating and cooling surfaces of industrial plant. Types of treatment are compared; advantages of the use of specially developed organic surface active agents. Related compounds, such as anti-foams, oxygen scavengers and neutralizing amines; their applications. (R2q, R4c, R10b)

711-R.* **Water Main Protection.** *Corrosion Prevention & Control,* v. 5, Oct. 1958, p. 63-64.

Technique which makes use of a range of materials developed from petroleum jelly under the trade name Denso. They retain their plasticity indefinitely over a wide range of temperatures. (R10e, T26r)

712-R.* **Ships' Bottom Paints in Relation to Cathodic Protection.** T. A. Banfield. *Corrosion Technology,* v. 5, Aug. 1958, p. 243-246.

(*)**Articles Available Through Photocopy Service; See Coupon, p. 91.**

Cathodic protection principles and design of installations including type and composition of anode materials. Tests prove that non-saponifiable such as vinyl, bituminous materials and some types of synthetic rubbers are the best coatings for bottoms of cathodic protected ships, particularly on areas close to the anodes. 11 ref. (R10d, L26, T22g)

713-R.* Developments in Ships' Protective Coatings. F. Perkins. *Corrosion Technology,* v. 5, Aug. 1958, p. 247-249.

Analysis of sources and mechanisms of corrosion with methods of preventing the electrochemical reaction. Polymers, vinyls, bituminous materials and chlorinated rubber for underwater coatings; top-side paints; primers and paints that give diversity of service and protection.
(R4b, T22g, L26)

714-R.* Propeller Corrosion and Cavitation Erosion—Its Prevention by Cathodic Protection. M. G. Duff. *Corrosion Technology,* v. 5, Aug. 1958, p. 250-253.

Sources of trouble from corrosion and cathodic protection systems of various types of vessels. (R10d, T22)

715-R.* Cathodic Protection Under Present Freight Conditions. *Corrosion Technology,* v. 5, Aug. 1958, p. 254-256.

Major tanker companies find cathodic protection economical. Designs and capabilities of cathodic protection system, including spherical collared anodes, used in the deep tanks and on the hulls. (R10d, T22g)

716-R.* Reducing Cathodic Protection Costs in Tankers. L. R. Page. *Corrosion Technology,* v. 5, Aug. 1958, p. 257-259.

Improved technique and design made it possible to modify anode sizes, area-to-weight ratios and anode disposition. Epoxy resin coatings, finned anodes and attachments improved efficiency of cathodic protection in tanks. High-purity Zn anodes automatically regulate current output and are used in protecting the hull and propeller.
(R10d, T22g)

717-R.* Corrosion in the Food Industry. J. W. Selby. *Food Manufacture,* v. 33, Oct. 1, 1958, p. 403-410.

Principal corrosive constituents encountered are atmospheric oxygen, organic acids, chlorides, labile sulphur and sometimes sulphur dioxide (used as a food preservative). The 18-8 Cr-Ni steels with Mo show the greatest resistance to most acid chloride conditions and will even give fair service when SO_2 is present. Corrosive behavior of Ni, Monel, Inconel and Sn analyzed. 7 ref.
(R7n; SS, Ni)

718-R. Corrosion Behaviors of Plutonium and Uranium. J. T. Waber. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/699, 1958, 31 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Relatively mild attack on both Pu and U by O is accelerated by moisture. If corrosion by H_2O occurs in the absence of O, the attack is even more aggressive than if O is present. 18 ref. (R4; Pu, U)

719-R. Effects of Alloying on the Kinetics of Oxidation of Niobium. W. D. Klopp, C. T. Sims and R. I. Jaffee. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/-P/712. 1958, 39 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Kinetics of the Cb-O and Cb-air reactions investigated at 400-550° C. and 600-1200° C. respectively. Effects of binary additions of V, Mo, Cr, Ti, Zr and W on the Cb-air reaction investigated at 1000 and 1200° C. Weight-gain data were obtained for Cb ternary alloys in air at 600, 800 and 1000° C. 18 ref.
(R1h, 2-60; Cb-b)

720-R. High Temperature Aqueous Corrosion of Aluminum Alloys. J. E. Draley, C. R. Breden, W. E. Ruther and N. R. Grant. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/714, 1958, 18 p. Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Corrosion of alloy X8001 in distilled water at various temperatures. From 150 through 290° C., a reasonably good straight line represents the log of the corrosion rate as a function of the reciprocal of the absolute temperature. 8 ref.
(R4a, 2-62; Al-b)

721-R.* (English.) **Oxidation Rate of Steel and Cast Iron in a Steam Atmosphere.** P. Szeki. *Acta Technica,* v. 22, no. 1-2, 1958, p. 129-134.

Based on experiments with cast iron (3.28% C, 0.33% Mn, 1.74% Si, 0.10% S, 0.29% P) exposed to a steam atmosphere at 750° C. and with mild low-carbon steel (0.11 C, 0.39 Mn, 0.23 Si, 0.031 S, 0.031 P) in steam at 650° C.; formulas for the oxidation rate constant are found for each of both materials thought useful in oxide coating. 7 ref. (R4d; Cl-b, CN-g)

722-R.* (German.) **Behavior of Oxide Layers on Metals.** L. Vlasakova. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 536-538.

Effect of the properties of the films—absorption, emissivity, conductivity and diffusion—on the kinetics of surface reactions and corrosion. 4 ref. (R1a)

723-R. Corrosion in Water Engineering. A. W. Neal. *Corrosion Prevention & Control,* v. 5, Oct. 1958, p. 46-48.

Comparison of protective coatings on steel pipes, boilers and cisterns.
(R4, R10, T26q; ST, CI, 4-60)

724-R. Study of the Passivity of Metals in Inhibitor Solutions, Using Radioactive Tracers. Pt. 1. Action of Neutral Chromates on Iron and Steel. D. M. Brasher and A. H. Kingsbury. *Faraday Society, Transactions,* v. 54, Aug. 1958.

Using potassium chromate labelled with Cr51, during immersion of steel in chromate solution, logarithmic growth of an oxide film, containing chromic and iron oxides, is seen to proceed in a manner similar to that of oxide film growth in air. 20 ref. (R10c, 1-59; ST)

725-R. Optical Measurement of Film Growth on Silicon and Germanium Surfaces in Room Air. R. J. Archer. *Electrochemical Society,* Abstract no. 70, May 1957, p. 153-161.

Ellipticity of polarized light reflected from the surfaces was measured to obtain film growth rates.
(R2r; Ge, Si, 14-61)

726-R. Have You Tried Titanium to Check Corrosion? *Petroleum Engineer,* v. 30, Sept. 1958, p. C-12.

Typical chemical plant applications. (R-general, T29; Ti, 17-57)

727-R. Some Basic Problems of the Formation and Adherence of Scale on Iron. H. Engell and F. Wever. *Acta Metallurgica,* no. 5, Dec. 1957, p. 695-702. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1360.)

(R2q; Fe)

728-R. Oxidation of Steels in Superheated Steam. P. Grobner and Z. Bret. *Hutnicke Listy,* v. 12, no. 2, 1957, p. 125-131. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1361.)

Previously abstracted from original. See item 419-R, 1957.
(R4d, R1h; ST)

729-R. Corrosion of Stainless Steels in Solutions Containing Hydrofluoric Acid. M. M. Kurtepov and A. S. Gryaznova. *Trudy Komissii po Bor'be Korroziei Metal Akademii Nauk SSSR, Otdelenie Khimicheskikh,* no. 2, 1956, p. 49-58. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4009.)

(R6g; SS)

730-R. Theory of Underground Corrosion of Metals. N. D. Tomashov. *Uspekhi Khimii,* v. 26, no. 2, 1957, p. 139-163. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-26K22R.)

(R8)

731-R. High-Temperature Corrosion of Metals by Hydrogen Sulphide. K. I. Tseitlin, L. V. Merzloukhova and V. A. Strunkin. *Zhurnal Prikladnoi Khimii,* v. 30, no. 10, 1957, p. 1553-1558. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-48K23R.)

(R7k; 2-62)

732-R. (German.) **Cooperative Experiments on the Standardizing of Corrosion Tests.** W. Wiederholt. *Metalloberflache,* v. 12, Oct. 1958, p. 305-307.

Testing by salt water spray and holding in damp atmospheres (R11)

733-R. (German.) **Steels Resistant to Corrosion by Gases.** V. Cihal. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 513-514.

Resistance of steel against corrosion by hydrogen depends primarily on the stability of iron carbides. Influence of alloy constituents; a number of W-Ti steels were investigated. (R6q; AY)

734-R.* (Japanese.) **Study of Die Casting of Hydronalium. Pt. 2.** Takuichi Morinaga, Tsuneo Takahashi, Goro Omori and Hiroshi Oba. *Japan Foundrymen's Society, Journal,* v. 30, July 1958, p. 548-553.

Corrosion tests using 3% sodium chloride solution were utilized to determine influence of iron concentration. Corrosion resistance of Al alloys containing 8% Mg was not affected by 1.3 to 1.8% Fe nor in the case of 2.5% Mg alloys by 0.7 to 0.9% Fe.
(R-general, 2-60; Al-f, *Fe, Mg,* 5-61)

Inspection and Control

643-S.* Steel Castings for Radioactive Service. George Sorkin. *Foundry,* v. 86, Oct. 1958, p. 71-73.

Experience in the purchase and inspection of steel castings for radio-

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

active service is seen in the latest revision in specifications. In addition to requirements for cleaning, heat treatment and resistance to intergranular corrosion, nondestructive testing by radiography, liquid penetrant examination and hydrostatic tests are required.
(S12, S13, 2-67; ST, 5-60)

644-S.* (Russian.) **Use of Betatron to Study Metal Defects.** A. E. Byzynov, M. D. Mochalov and I. G. Fakidov. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 986-988.

Use of betatron gamma defectoscope with radiation of sufficient intensity at comparatively short intervals makes it possible to reveal tiny defects in steel 500 mm. thick. 14 ref. (S13e; ST)

645-S.* (Russian.) **Use of Radiography for Measurement of Thickness of Rolled Sheet.** A. M. Bogachev. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 1029-1032.

It is recommended that for sheet from 0.03 to 0.5 mm. thick β-rays be used, and from 0.5 to 3 mm. soft γ-rays be used. (S14e; ST, 4-53)

646-S.* **Radiographing Fusion Welded Joints in Steel Plate Up to Two Inches.** *Canadian Machinery,* v. 69, Aug. 1958, p. 114-116.

Recommended practice of the International Institute of Welding for X-ray and gamma-ray inspection to insure uniform results. Three classes of inspection; image quality indicator devices. (S13e; ST, 7-51)

647-S.* (French.) **Industrial Application of Alpha Radioactivity to the Continuous Determination of Uranium in Solution.** J. D. Le Franc, P. Pottier and G. Roux. *Energie Nucleaire,* v. 2, July-Sept. 1958, p. 195-201.

A method for determination of U in leaching solutions of uranium-bearing ores by measurement of the alpha radioactivity of these solutions make it possible to follow variations of concentration in U during recovery of the metal by means of anion-exchanger resins. Reasons for choice of alpha radiation, etc. Application of method to recovery of U in sulphuric and alkaline solutions; apparatus designed for industrial usage. (S11q, C19s; U)

648-S. **Separation of Rhodium and Iridium From Base Metals by Ion Exchange.** Alice G. Marks and F. E. Beamish. *Analytical Chemistry,* v. 30, Aug. 22, 1958, p. 1464-1466.

11 ref. (S11f; Ir, Rh)

649-S. **Spectrographic Analysis of Silicon-Germanium Alloys.** Marvin C. Gardels and Hubert H. Whitaker. *Analytical Chemistry,* v. 30, Aug. 22, 1958, p. 1496-1498.

12 ref. (S11k; Ge, Si)

650-S. **Automatic Inspection.** D. H. McConnell. *Mechanical Engineering,* v. 80, Oct. 1958, p. 65-67.

Automatic preprocess, in-process, and post-process gaging builds precision and higher production into the modern machine tool. Signals from gages insure quality, effect savings. (S14, G17, 18-74)

651-S. **Tube Testing Gains Precision.** *Steel,* v. 143, Oct. 13, 1958, p. 104-106.

Republic Steel Corp.'s Farrowtest machine works on the eddy-current principle to locate internal defects in tubing. (S13h; 4-60; ST)

652-S. (English.) **Separation of Rhenium by Coprecipitation and Its Determination in Molybdenite.** Yen Jen-Yin and Tao Tseng-Ning. *Scientia Sinica,* v. 7, July 1958, p. 730-737.

15 ref. (S11f, S11j; Re)

653-S. (German.) **Determination of Oxygen Content of Steel by the Gotta Process.** Erich Stengel. *Archiv für das Eisenhüttenwesen,* v. 29, June 1958, p. 351-352.

Under accurately maintained environmental conditions the results are not quite as reliable as those obtained from vacuum melting but are satisfactory for normal laboratory control purposes. (S11r; ST, *O*)

654-S.* **Nondestructive Testing Methods of Quartermaster Items and Aerial Delivery Evaluation.** Roderick W. Browne. *Nondestructive Testing,* v. 16, Sept-Oct. 1958, p. 385-396.

The Quartermaster Corps has an unusual position in that quality must be controlled at the time of production, during testing and evaluation, and throughout storage until use. As a quality control and inspection method, nondestructive testing is used as an inspection method before testing, a control method during testing, and an evaluation application following the test. (S13)

655-S.* **An Evaluation of the Effectiveness of Penetrants.** R. E. Kleint. *Nondestructive Testing,* v. 16, Sept-Oct. 1958, p. 421-429.

Penetrant inspection is a valuable tool for detecting surface defects and is becoming increasingly important with the increased use of nonmagnetic structural materials such as Ti and nonmagnetic stainless steels. Investigations designed to develop a method of evaluating the effectiveness of penetrants, evaluate the effect of variables (such as machining, anodizing and vapor honing) on the effectiveness of penetrants, compare effectiveness of penetrants to other means of detecting surface defects such as etching or chromic acid anodizing of Al alloys. (S13k)

656-S.* **Radiography and Autoradiography of Plutonium.** Dana E. Elliott and Gerold H. Tenney. *Nondestructive Testing,* v. 16, Sept-Oct. 1958, p. 430-437.

By selecting the right energy of radiation, radiographic inspection can give valuable information about the internal physical condition of plutonium. When familiar with the type of radiation originating in this metal, radiographers can take preventive measures to avoid its damaging influence on the radiographic image. The presence of this radiation can be utilized to study the quality of the coatings surrounding the material. Such study is absolutely necessary to protect the objects under investigation as well as the lives of workers handling this material. (S13e, A7r; Pu)

657-S. (English.) **Separation of Rhenium by Coprecipitation and Its Determination in Molybdenite.** Yen Jen-Yin and Tao Tseng-Ning. *Scientia Sinica,* v. 7, July 1958, p. 730-737.

15 ref. (S11a; Re)

658-S. (French.) **Determination of Phosphorus in Aluminum-Silicon Alloys.** Vsevolod Kuhn. *Fonderie,* June 1958, p. 279-282.

Metal is treated in HCL in hydrogen atmosphere, thus freeing soluble phosphorus in form of gaseous phosphuretted hydrogen, which is collected in a solution of brominated hydrobromic acid. Phosphoric acid thus formed is determined photocolorimetrically, using reduced phosphomolybdate method, currently used in analysis of steels. A large fraction of phosphorus remains in undissolved Si. Latter is treated by nitrohydrofluoric solution; phosphorus remaining in residue after evaporation is determined colorimetrically, as above. 7 ref. (S11a; Al, P, Si)

659-S. (Japanese.) **Rapid Simultaneous Photometric Determination of Aluminum and Iron in Titanium or Vanadium by the Oxinate Extraction Method.** Hiroshi Hashitani and Kenji Motojima. *Japan Analyst,* v. 7, Aug. 1958, p. 478-483.

12 ref. (S11a; *Al, Fe,* Ti, V)

660-S. (Japanese.) **Rapid Absorption Spectro-Photometric Determination of Phosphorous in Steels and Special Steels by the Extraction Method.** Mitsuru Ura. *Japan Analyst,* v. 7, July 1958, p. 420-424.

10 ref. (S11a; ST, *P*)

661-S. (Japanese.) **Direct Polarographic Determination of Lead in Free-Cutting Steel.** Kazuo Ota. *Japan Analyst,* v. 7, July 1958, p. 429-432.

(S11m; ST, *Pb*)

662-S. (Russian.) **Chromatographic Determination of Small Admixtures in Nickel-Based Pure Metals.** V. V. Stepin, V. I. Ponosov and E. V. Silaeva. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 934-938.

Determination of small quantities of bismuth, lead, cobalt, nickel, phosphorus, iron and copper. 12 ref. (S11g; Ni, *Bi, Co, Cu, Fe, P, Pb*)

663-S. (Russian.) **Radiometric Determinatian of Uranium, Thorium and Radium in Ores.** E. I. Zheleznova and D. V. Tokareva. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 959-963.

5 ref. (S11q; U, Ra, Th, RM-n)

664-S. (Russian.) **Radiometric Determination of Calcium in Minerals.** S. I. Krichmar and L. G. Kaistra. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 925-927.

(S11q; Ca, RM-n)

665-S. (Russian.) **Method of Multiple Radioactive Dilution for Determination of Small Admixtures in Metals.** I. E. Zimakov and G. S. Rozhavskii. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 922-925.

Method makes possible determination of admixtures up to size of 10^{-7}%. Applied to determination of Sb in Pb. (S11q; Pb, *Sb*)

666-S. (Russian.) **Spectrophotometric Determination of Columbium in Alloys.** I. P. Kharlamov, P. Ya. Yakovlev and M. I. Lykova. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 928-932.

Alloys contained Si, W, Mo and Ti. Results corresponded with volumetric tests. Reproducible results also good. 7 ref. (S11k; Cb)

667-S. (Russian.) **Determination of Silver in Alloys by Radiometric Titration.** V. I. Plotnikov. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 927-928.

Determination of Ag in Cu and Pb-base alloys using strongly acidic solutions containing up to 10% HNO_3. (S11q; *Ag,* Cu, Pb)

668-S. (Russian.) **Analysis of Pure Metals.** V. A. Nazarenko and G. G. Shitareva. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 932-934.

Determination of admixtures of Co in Bi. Method also applicable for determination of Co in Sb, Ge, and Ti. 4 ref. (S11; Co, Ge, Sb, Ti)

669-S. (Russian.) **Chipless Method for Analyzing Metals and Alloys.** A. G. Loshkarev. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 939-940.

Consists of gravimetric analysis of the basic components followed by computation of percentage of admixtures in alloy by use of a given formula. Determination of weight of components can also be made by potentiometric and amperometric methods. (S11b)

670-S. (Russian.) **Determination of Silicon Content in Surface Layers by Microhardness Method.** Z. G. Ordina. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 1015-1016.

Method of studying changes in surface hardness as a result of changes in chemical composition of metal can be applied to many other elements. (S11g, Q29q; Si)

671-S. (Spanish.) **Rapid Determination of Phosphorus in Carbon Steels and Cast Irons by Colorimetry and Photo-Absorptiometry.** Ricardo de la Cierva. *Instituto del Hierro y del Acero,* v. 11, Apr-June 1958, p. 85-90.

Method permits determination of P during production of steel in electric furnace; also applicable to cast irons; gives results in 7 to 12 min. 19 ref. (S11a, S11g; ST-f, *P*)

672-S.* **Production Inspection of Pipe and Tubing by the Immersed Ultrasonic Method.** R. B. Oliver, R. W. McClung and J. K. White. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 62-79.

Use of ultrasonic techniques detects extremely small defects in pipe designed for critical applications. Method is rapid, highly reliable. (S13g, 4-60)

673-S.* **An Eddy Current Test for Capillary Tubing.** W. R. Plant and C. Mannal. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 80-87.

Highly sensitive apparatus for flaw detection, especially radial cracks and longitudinal seams. (S13h, 1-53; 4-60)

674-S.* **Two Applications of Eddy Current Instruments to Testing of Zircaloy Core Components.** R. A. Betz. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 119-126.

Method detects both flaws which cause in-service failure and those affecting heat transfer properties of the cladding materials. (S13h, T11g; Zr)

675-S.* **Use of Penetrants for Inspection of Small Diameter Tubing.** R. B. Oliver, G. M. Tolson and A. Taboada. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 127-141.

Surface inspection of Hastelloy, Inconel tubing with fluorescent penetrant is very effective for detecting cracks, laps; less so for broad, shallow defects. (S13k; Ni-b, 4-60)

676-S.* **Radiography of Materials Used in the Nuclear Energy Field.** J. W. Dutli and D. E. Grimm. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 150-164.

Techniques employed. Details of exposure for plastic, graphite, Be, Zr, Pb, Th, Ta, W alloy, U, Pu and Au. (S13e, T11; Be, Zr, Pb, Th, Ta)

677-S.* **Ultrasonic Testing as a Method of Determining Variables in Processing Zircaloy and Hafnium.** Edwin W. Fink. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 175-180.

Testing method to detect laps, laminations, cracks and other defects occurring during processing. (S13g, T11; Zr, Hf)

678-S.* **Testing of Cylindrical Fuel Elements With the Cyclograph.** W. J. McGonnagle. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 214-224.

Use of cyclograph to detect voids and cracks, nonbonded areas and thin spots in the clad of U rods encased in 2S Al cans. (S13h, T11g; U, Al)

679-S.* **Nickel Thickness Gage.** Louis H. Cook, Jr. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 225-230.

Thickness of Ni foils from 0.001 to 0.0006 in. is determined within ± 10% by measuring reluctance of magnetic circuit. (S14h, X20c; Ni, 4-56)

680-S.* **Radiography of Fuel Elements and Fuel Materials Using Cesium-137.** Merle L. Rhoten. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 266-272.

Cesium-137 fills energy gap in the range 0.4-0.6 Mev between 14-192 and Co-60 for radiography of heavy elements and fuel components. (S13e, T11g; Cs, 14-63)

681-S.* **Measurement of Cladding Thickness on Uranium by Autoradiography.** G. E. Bradley, W. J. McGonnagle and P. R. Gonzales. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 294-303.

Use of the natural radioactivity of the core material to measure the cladding thickness of Zr-clad fuel elements. Accuracy of ±0.5 mil at a scanning speed of 4 in. per min. 4 ref. (S14e; U, *Zr*, 8-66)

682-S.* **Analysis for Certain Metallic Impurities in Niobium.** James F. Reed. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 54-56.

General problems of dissolving samples and separation of constituents. Typical results of determination of Fe, Ti and Zr in commercial Cb. 5 ref. (S11; Cb, 9-51)

683-S.* **The Determination of Nitrogen and Oxygen in Niobium.** William F. Harris. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 57-59.

Two methods for determination of nitrogen in Cb. Results obtained by solution distillation and alkali fusion methods were in good agreement. Vacuum fusion technique employing a Pt bath was used for determination of oxygen in Cb. 4 ref. (S11r; Cb, *N, O*)

684-S.* (Japanese.) **Recent Methods for Measurement of Surface Roughness.** K. Yamamoto. *Metals,* v. 28, Oct. 1958, p. 752-757.

Quantitative expressions for roughness are represented by either maximum height, root mean square height deviation, centerline average height, form factor, contact ratio or bearing curve. Measurements are done either mechanically, optically or electrically. (S14)

685-S. **Plating Thickness Indicator Designed.** *Industrial Finishing (London),* v. 10, Sept. 1958, p. 44-45.

(S14c, L17, X20c)

686-S. **How to Conquer Gaging Errors.** C. W. Kennedy. *Iron Age,* v. 182, Oct. 23, 1958, p. 70-72.

(S14h, X20)

687-S. **Roughness Standards Today.** E. Bickel. *Microtecnic,* v. 12, Apr. 1958, p. 41-50.

(S15, S22)

688-S. **X-Ray and Gamma-Ray Units Produce Permanent Records.** *Modern Machine Shop,* v. 31, Nov. 1958, p. 122-125.

Combination of X-ray and gamma-ray permits high-pressure valves and castings to be inspected eight times faster. (S13e, T7b, 5-60)

689-S. **Spectrographic Determination of Calcium, Magnesium, Copper, Aluminum, Iron, Titanium and Boron in Highly Pure Silicon.** R. R. Shvangiradze and T. A. Mozgovaya. *Journal of Analytical Chemistry of the USSR,* v. 12, 1957, p. 725-730. (Translation by Consultants Bureau, Inc.)

5 ref. (S11c; Si, *Ca, Mg, Cu, Al, Fe, Ti, B*)

690-S. **Spectrographic Determination of Gold, Platinum, Palladium and Rhodium in Poor Products (Ores, Slags, and Waste Solutions).** D. M. Livshits and S. E. Kashlinskaya. *Journal of Analytical Chemistry of the USSR,* v. 12, 1957, p. 731-733. (Translation by Consultants Bureau, Inc.)

(S11c; RM-n, RM-q, *Au, Pt, Pd, Rh*)

691-S. **Determination of Oxygen and Hydrogen in Titanium.** Z. M. Turovtseva and R. Sh. Khalitov. *Journal of Analytical Chemistry of the USSR,* v. 12, 1957, p. 737-739. (Translation by Consultants Bureau, Inc.)

A vacuum fusion method in which coarse graphite powder is used. 7 ref. (S11g, Ti, *OH*)

692-S. **Conductometric Determination of Aluminum.** G. B. Pasovskaya. *Journal of Analytical Chemistry of the USSR,* v. 12, 1957, p. 783-784. (Translation by Consultants Bureau, Inc.)

4 ref. (S11g; Al)

693-S. **Mineralogic Make-Up of Fluxed Sinter From Krivoi-Rog Iron Ores.** E. F. Vegman. *Zavodskaya Laboratoriya,* v. 24, no. 4, 1958, p. 444-446. (Henry Brutcher, Altadena, Calif., Translation no. 4326.)

Previously abstracted from original. See item 529-S, 1958. (S11; RM-n, Fe)

694-S. (German.) **Thermo-Electric Determination of Silicon in Cast Iron.** Gunther Bierwirth. *Giesserei,* v. 45, Sept. 11, 1958, p. 546-549.

(S11g, X25g; CI, *Si*)

695-S. (German.) **Determination of Hydrogen in Aluminum Castings by the Density Quotient Method.** Philipp Schneider and Wolfgang Buchen. *Giesserei,* v. 45, Sept. 11, 1958, p. 561-565.

14 ref. (S11g; Al, *H*, 5-60)

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

696-S. (German.) **Industrial Radiography With Radioactive Isotopes.** O. Werner. *Metall,* v. 12, Sept. 1958, p. 799-802.

5 ref. (S13e, 14-63)

697-S. (German.) **Influence of Magnesium in Determination of Zinc in Aluminum.** T. Torok and S. Cseti. *Mikrochimica Acta,* May 19, 1958, p. 538-544.

(S11; *Zn,* Al, *Mg*)

698-S. (Portuguese.) **Identification of Uranium.** Luiz Fernando de Carvalho. *Brasil Departamento Nacional da Producao Mineral, Bulletin,* no. 39, 1957, p. 11-13.

(S11; U)

699-S. (Portuguese.) **Spectrophotometric Determination of Cobalt.** David Goldstein and Aida Espinola. *Brasil Departamento Nacional da Producao Mineral, Bulletin,* no. 39, 1957, p. 19-28.

(S11k; Co)

700-S. Simple Test Identifies Stainless. *Iron Age,* v. 182, Nov. 13, 1958, p. 147.

Nitric acid, hydrochloric acid and sodium bismuthate used to distinguish between 200 and 300 series stainless steels. Test is completed within 1 min., can be performed easily. (S10p; SS)

701-S.* (German.) **Mathematical Statistics in Iron and Steel Mills. Pt. 1. Regression Analysis.** Helmut Knuppel, Arthur Stumpf and Bernhard Wiezorke. *Archiv für das Eisenhüttenwesen,* v. 29, Aug. 1958, p. 521-533.

By correlation methods the significant factors can be separated from the insignificant ones and a mathematical model representing the problem under study can be constructed. Calculations can then be reduced to filling in schematics. 4 ref. (S12, D3)

702-S.* (German.) **Ultrasonic Testing of Sheet Metal.** W. Lehfeldt. *Industrieblatt,* v. 58, Oct. 1958, p. 425-433.

Methods presently available for flaw detection in sheet metal of different thickness, in pieces or continuous bands; penetrating wave method. Impulse echo-sound method; characteristics of methods shown; number of sound-heads, kind of waves, indication of flaws, kind of indication, possibilities for automation; advantages and disadvantages. Selection of methods according to requirements of end products; timing and location. 13 ref. (S13q; 4-53)

703-S. Determination of Copper in Titanium, Zirconium and Their Alloys. D. F. Wood and R. T. Clark. *Analyst,* v. 83, Sept. 1958, p. 509-516.

1 ref. (S11; Ti, Zr, *Cu*)

704-S. Photometric Method for Determination of Tungsten in Low-Grade Mine Ore and Mineral-Dressing Products. J. B. Pollock. *Analyst,* v. 83, Sept. 1958, p. 516-522.

7 ref. (S11a; *W,* RM-n)

705-S. Spectrophotometric Determination of Iron in High-Purity Bismuth. J. H. High and P. J. Placito. *Analyst,* v. 83, Sept. 1958, p. 522-525.

6 ref. (S11k; Bi, *Fe*)

706-S. Determination of Uranium, Zirconium, Magnesium and Iron in Bismuth Alloys. K. W. Kirby and R. H. A. Crawley. *Analytica Chimica Acta,* v. 19, Oct. 1958, p. 363-368.

(S11k; Bi, *U, Zr, Mg, Fe*)

707-S. Determination of Copper, Lead, Tin and Antimony by Controlled-Potential Electrolysis. Pt. 2. Application of the Method to the Determination of Cu, Pb, Sn and Sb in Bronzes and Brasses. B. Alfonsi. *Analytical Chimica Acta,* v. 19, Oct. 1958, p. 389-394.

(S11; Cu-n, Cu-s, *Sb, Sn, Pb*)

708-S. Determination of Boron in Aluminum-Uranium Fuel Elements. Kenneth W. Puphal, James A. Merrill, Glenn L. Booman and James E. Rein. *Analytical Chemistry,* v. 30, Oct. 1958, p. 1612-1614.

8 ref. (S11, T11g; Al, *U, B*)

709-S. Volumetric Determination of Thorium in Uranium Alloys. Hobart H. Willard, Arthur W. Mosen and Ross D. Gardner. *Analytical Chemistry,* v. 30, Oct. 1958, p. 1614-1616.

7 ref. (S11j; U, *Th*)

710-S. Simple Analytical Control for Small Foundries. W. A. Burford. *Engineer and Foundryman,* v. 24, Aug. 1958, p. 44-47.

Extremely rapid, simple method of determining percentages of Sn, Pb, Zn, P and Ni in Cu alloys. Accuracy sufficient for specifications. (S11j; Cu-b, *Sn, Pb, Zn, P, Ni*)

711-S. Determination of Cobalt in Iron and Steel. R. C. Rooney. *Metallurgia,* v. 58, Oct. 1958, p. 205-208.

After preliminary separation of Fe and Cu by extraction of their cupferrates into chloroform, residual cupferron is destroyed and the Co extracted into benzene. Other metallic complexes are destroyed, excess reagent removed, and the Co determined spectrophotometrically. 6 ref. (S11k; ST, *Co, Fe*)

712-S. Radiation Damage Resistance of Some Rare Earth Cermets. W. K. Anderson and D. N. Dunning. *Nuclear Science and Engineering,* v. 4, Sept. 1958, p. 458-466.

Europium oxide and gadolinium oxide stainless steel cermets in ranges of 5 to 30% rare earth oxide have been irradiated in the MTR. 5 ref.

(S10; S19; SS, Eu, Gd, 6-70, 2-67)

713-S. Analysis of Microquantities of Antimony, Tin and Arsenic in Ferrotungsten. Hidehiro Goto, Yachiyo Kakita and Masahiko Sase. *Tohoku University, Science Reports of the Research Institutes,* v. 10, June 1958, p. 207-211.

Spectrophotometric method is proposed.

(S11k; Fe, W, AD-n31, *Sb, Sn, As*)

714-S. Simplified Determination of Microquantity of Carbon in Iron, Steel and Ferro-Alloy. Hidehiro Goto, Toshio Watanabe and Kyohei Suzuki. *Tohoku University, Science Reports of the Research Institutes,* v. 10A, no. 2, 1958, p. 97-102.

(S11; *C,* CI, ST, AD-n31)

715-S. Spectrographic Determination of Magnesium in Bismuth-Uranium Alloys. J. C. Cotterill. *United Kingdom Atomic Energy Authority, AERE C/R 2456,* 1958, 7 p.

Bi alloys are converted to oxide and mixed with a spectrographic buffer containing ferric sulphate. Pellets of this mixture are excited in the d-c. arc using Cu electrodes, and spectra are evaluated by microphotometry using the Fe as internal standard. The effective concentration range is 50-700 ppm.

(S11c; Bi, U, *Mg*)

716-S. Improved Analytical Methods of Separating Lead. G. W. C. Milner, J. W. Edwards and A. Paddon. *United Kingdom Atomic Energy Authority, AERE C/R 2612,* 1958, 6 p.

Ion exchange and solvent extraction methods investigated for the separation of Pb in the analysis of Pb-base materials. 6 ref.

(S11f, C19; Pb)

717-S. Analysis of Sodium Metal and Sodium-Potassium Alloy. *United Kingdom Atomic Energy Authority* IGO-AM/CA-110, 1958, 65 p.

(S11; K, Na)

718-S. Polarography of Europium and Ytterbium. James O. Hibbits, Mary R. Menke and Warren F. Davis. General Electric Co., Atomic Products Div. Aug. 11, 1958. *U. S. Atomic Energy Commission, APEX-405,* 19 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.75.

Investigation carried out with lithium chloride, ammonium chloride and tetramethyl ammonium bromide as supporting electrolytes. Wave characteristics and data for diffusion-current constants were determined. 7 ref. (S11m; Eu, Yb)

719-S. Non-Destructive Determination of U^{235} Content of Rod-Shaped Fuel Elements by Gamma Pulse Spectrometry. W. C. Judd, M. B. Leboeuf. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission KAPL-1925,* 30 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Method depends on detection of a relatively penetrating 184-kev. gamma ray which is emitted in U^{235} decay. 7 ref. (S19, T11g; U)

720-S. Employment of Lead Screens to Improve Industrial Radiographic Inspection Methods. C. Grogan, M. G. Keefe and C. A. Penrose. Watervliet Arsenal. *U. S. Office of Technical Services,* PB 131537, Jan. 1957, 55 p.

(S13e; Pb, 17-57)

721-S. Introduction to Eddy Current Methods and Techniques. H. L. Libby. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 13-28.

Basic principles and techniques of eddy current testing. (S13h)

722-S. Survey of Ultrasonic Methods and Techniques. S. A. Wenk. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 29-43.

(S13g)

723-S. Survey of Radiation Techniques. Gerold H. Tenney. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 44-61.

22 ref. (S13e)

724-S. Eddy Current Measurement of Clad Thickness. J. W. Allen, R. A. Nance and R. B. Oliver. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 201-213.

Basic principles of eddy current testing as applied to metal thickness and cladding thickness measurements. Results illustrate capability to measure small cladding thicknesses accurately and reliably. 4 ref. (S14h; 8-66)

725-S. Ultrasonic Transmission Tester for Detection of Unbonded

Areas. J. D. Ross and R. W. Leep. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 238-245.

An ultrasonic pulse is transmitted through the object under inspection and the received pulse is checked for abnormal attenuation. The abnormally attenuated pulses can be counted as the object is scanned and the total count is a measure of the area over which the defect extends. (S13g)

726-S. Electrode Potential Method of Bond Testing. W. G. Marburger, J. H. Monaweck and W. J. McGonnagle. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 278-285.

Utilizes principle that the electrical resistivity in the immediate neighborhood of a flaw differs from that in solid metal. Specially designed electrodes have made continuous semi-automatic scanning of a specimen possible. (S13c)

727-S. Radiographic Inspection of Nuclear Core Materials and Components. A. E. Oaks. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 304-319.

Utility of different types of radiographic equipment. Exposure data are given for Zr, Hf and U alloys in the range of 150 to 1000 kv. Conversion factors relating these alloys to equivalent thicknesses of steel are also given.
(S13e, T11; Zr, Hf, U)

728-S. Techniques for X-Ray Examinations of End-Weld Closures of Cylindrical Fuel Elements. S. S. Sidhu. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 320-327.
(S13e, T11g; U, 7-51)

729-S. Helium Leak Detection Techniques. W. H. Pappin. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 328-338.

A practical, relatively inexpensive, very accurate, and convenient nondestructive test in many fields where leak-tight joints are important. (S18q, T11)

730-S. A Nondestructive Method for Fuel Assaying. S. G. Forbes. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 375-381.

A nondestructive method of assaying the Materials Testing Reactor fuel assemblies for their U^{235} content before they are loaded into the reactor. (S19, T11g; U)

731-S. Analysis for Plutonium by Controlled Coulometry. F. A. Scott and R. M. Peekema. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/914, 1958, 11 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Method can be applied to the determination of Pu solution concentrations in the range of 0.05 to 50 g. per liter. Electronic equipment, titration cells and procedures are simple and dependable enough for routine application in a control laboratory. (S11m; Pu)

732-S. Spectrographic Determina- of Oxygen, Nitrogen and Hydrogen in Metals. V. A. Fassel, W. A. Gordon and R. J. Jasinski. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/917, 1958, 15 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Experimental techniques and equipment for determination of oxygen and nitrogen in steel, oxygen in Ti, Zr, Nb, Y and hydrogen in Ti. 9 ref.
(S11c, S11r; ST, Ti, Cb, Y, *H, O, N*)

733-S. Analysis of Thorium. Charles V. Banks. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/918, 1958, 40 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Chemical methods for the determination of impurities. Gravimetric, titrimetric, polarographic and spectrophotometric determinations. 319 ref. (S11; Th, 9-51)

734-S. X-Ray Spectroscopy of Rare Earth Elements. F. W. Lytle, K. R. Stever and H. H. Heady. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1425, 1958, 11 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Methods developed for determining rare-earth elements in bastnaesite and euxenite ore fractions and for analyzing high-purity rare-earth oxides. Samples investigated contained all combinations of 14 rare earths plus Y and Th. 10 ref.
(S11c; Th, Y, EG-g, RM-n)

735-S. Determination of Small Carbon Contents in Iron by Damping Measurements. W. Wepner. *Archiv für das Eisenhüttenwesen,* v. 27, Jan. 1956, p. 55-59. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB66.)
(S11g; *C*, Fe)

736-S. New Process for Sampling of Killed and Rimming Steel for Determination of Oxygen and Hydrogen. Hermann Schenck. *Archiv für das Eisenhüttenwesen,* v. 28, 1957, p. 123-125. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB41.)

Previously abtsracted from original. See item 366-S, 1957.
(S12h, S11r, 1-53; ST, *O, H*)

737-S. Nondestructive Testing of Metals With Electromagnetic Instruments Using Probes. H. Breitfeld. *Metall,* v. 9, no. 1-2, 1955, p. 14-22. (Henry Brutcher, Altadena, Calif., Translation no. 4408.)

Previously abstracted from original. See item 44-S, 1955.
(S13c, S14c)

738-S. Behavior of Metallic Heating Elements in Service Life Testing. A. Schulze and D. Bender. *Metallwissen und Technik,* v. 9, no. 1-2, 1955, p. 7-13. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-53G8G.)

Previously abstracted from original. See item 43-S, 1955.
(S21; Ni, Cr, Fe, Al)

739-S. Contribution to the Use of Mathematical Statistics in the Steel Industry. K. Orths. *Stahl und Eisen,* v. 78, no. 1, 1958, p. 14-21. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1584.)

Previously abstracted from original. See item 103-S, 1958.
(S12; ST)

740-S. (German.) **Observations on the Selective Separation of Iron by Solvent Extraction.** Hermann Specker. *Archiv für das Eisenhüttenwesen,* v. 29, Aug. 1958, p. 467-470.

Separation with Diaethyl-ether, ammonium thiocyanate, lithium chloride and isobutylmethylketone; improvement of selectivity, coefficient of extraction and mixtures. 16 ref. (S11f; Fe)

741-S. (German.) **Direct Determination of Carbon in Pig and Cast Iron.** Heinz Krapp and Karl-Heinz Tytko. *Giesserei,* v. 45, Oct. 9, 1958, p. 639-642.

5 ref. (S11; C, CI-a, CI-b)

742-S. (German.) **Standardization as Applied to Cast Iron, Cast Steel and Malleable Cast Iron.** A. Knickenberg. *Industrie-Anzeiger,* v. 80, Sept. 12, 1958, p. 28-30.
(S22; CI-b, CI-s, ST)

743-S. (German.) **Testing of Materials Plated With Precious Metals.** H. Spengler. *Metall,* v. 12, July 1958, p. 598-603.

Survey of various tests required for precious metal coatings such as nondestructive testing methods, determination of physical, mechanical and chemical properties, metallographic tests and corrosion resistance tests. These methods are demonstrated on plate which is used on jewelry. (S-general, P-general, Q-general; EG-C31, 8-62)

744-S. (German.) **Spectrum Analysis of Metals, Alloys and Ores.** W. Nabholz. *Schweiz. Technische Zeitschrift,* v. 55, June 26, 1958, p. 529-536.

Instruments such as spectroscopes, spectrographs, spectrometers. Methods of quantitative and qualitative evaluation. (S11k)

745-S. (Japanese.) **Determination of Boron in High-Alloy Steel.** Shigeo Wakamatsu. *Japan Analyst,* v. 7, no. 6, 1958, p. 372-376.
(S11a; *B*, ST, SS)

746-S. (Norwegian.) **Fine-Zinc Alloys.** Georg Steinveit. *Teknisk Ukeblad,* v. 105, Aug. 14, 1958, p. 681-687.

Specifications for zincs used for die-casting alloys; composition of alloys used in France, Great Britain, Germany and U. S. Influence of alloying constituents such as Al, Cu and Mg. Impurities and their significance. Mechanical properties of different alloys. Effect of aging and temperature. (To be continued.) 11 ref. (S22, A-general; Zn-b)

747-S. (Polish.) **Amperometric Determination of Cobalt in Steels.** Konrad Szmidt and Jerzy Weber. *Prace Instytutow Mechaniki,* v 6, no. 19, 1957, p. 71-75.
(S11m; ST, *Co*)

748-S. (Rumanian.) **A New Microgravimetric Method for Determination of Thorium.** Th. I. Pirtea and Georgeta Mihail. *Anuarul Universitatei "C. I. Parhon" Seria: Stiinte Naturale,* no. 12, 1956, p. 51-55.
(S11b; Th)

749-S. (Rumanian.) **Polarographic Methods for Determination of the Quantitative Ratio of the Alkali Metals (Na:K) Without Preliminary Chemical Separation.** A. Duca. *Studii si Cercetari de Chimie Academia Republicii Populare Romine,* v. 4, no. 3-4, 1956, p. 131-144.
(S11m; Na, K)

750-S. (Rumanian.) **A New Method for Photometric Determination of Copper.** G. Spacu and J. Scherzer.

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

Studii si Cercetari de Chimie, Academia Republicii Populare Romine, v. 4, no. 3-4, 1956, p. 219-225.

(S11a; Cu)

751-S. (Rumanian.) **Determination of Silver by Precipitation in the Form of Elementary Silver.** S. Cosma and I. Ristici. *Studii si Cercetari Stiintifice, Academia Republicii Populare Romine Filiala Cluj. Seria I. Stiinte Matematice, Fizice, Chimice si Tehnice,* v. 6, no. 3-4, 1955, p. 131-135.

(S11j; Ag)

752-S. (Russian.) **Investigation of Ingot Cooling Process.** V. M. Dement'ev and M. M. Kotrovskii. *Stal',* v. 18, Sept. 1958, p. 847-851.

Method was perfected for determining temperature of ingots at various stages of operation after steel leaves the openhearth. Thermocouples and optical pyrometers used. (S16, X9q, X9r; ST, 5-59)

753-S. (Book.) **Electrodeposited Metallic Coatings.** American Society for Testing Materials. Compilation of Standards E-8, 124 p., 1958. $2.25.

Electrodeposited Zn, Cd, Ni, Cr and Pb for steel. Coatings for Cu, Cu-base alloys, Zn and Zn-base alloys. (S22; ST, Su-b, Zn-b, 8-62)

754-S. (Book.) **Rapid Analysis of Nonferrous Metals and Alloys.** George Norwitz. 112 p. 1957. Chemical Publishing Co., 212 5th Ave., New York 10, N. Y. $4.25.

(S11; EG-a38)

755-S. (Book.) **Symposium on Nondestructive Tests in the Field of Nuclear Energy.** 395 p. 1958. American Society for Testing Materials, STP no. 223, 1916 Race St., Philadelphia 3, Pa. $10.

Papers abstracted separately.
(S13, T11)

756-S.* (Japanese.) **Contact Angle of Water Drop on Low Carbon-Steel Surface Finished by Dry Polishing.** Ken'ichi Goto. *Metal Finishing Society of Japan, Journal,* v. 9, July 1958, p. 267-271.

Contact angle of a water drop on steel surfaces finished by dry mechanical polishing was used to determine degree of surface finishing and in the control of variables influencing surface finish. 7 ref. (S15f; ST)

757-S. **Determination of Small Amounts of Lead in Pure Metals and Ferro-Alloys.** L. S. Nadezhina and V. P. Razumova. *Journal of Analytical Chemistry of the USSR,* v. 12, 1957, p. 749-753. (Translation by Consultants Bureau, Inc.)

Technique for determination of small amounts of Pb (of the order of 0.01-0.002%) in Cr-Ni steels in metallic Cu, Cr, etc. 4 ref.
(S11m, *Pb*)

Metal Products and Parts

422-T. **Motor Industry Extends Use of Anodized Aluminum Trim.** *Industrial Finishing (London),* v. 10, Sept. 1958, p. 30-33.

Besides being corrosion resistant, anodized Al can be dyed, and is used for automobile bumpers and trim. (T21, 17-57; Al, 8-73)

423-T.* **Sturdy Steels for Springs.** *Iron Age,* v. 182, Oct. 16, 1958, p. 186-187.

Performance of a spring is tied to its design and the quality of the steel from which it is made. Spring steels must possess accuracy, ductility, hardenability, finish, high fatigue value and uniformity in response to forming and heat treatment from one lot to another. Tables of standard thickness tolerances, width tolerances for special edges and width tolerances for slit edges. (T7c, 17-57, S22; CN)

424-T.* **Designing With Steel for Lighter Aircraft.** Bruce Mitchell. *SAE Transactions,* v. 66, 1958, p. 406-413.

One of the better steels for thin sheet applications in light-weight aircraft structure is 17-7PH, because it can be heat treated without scaling. After annealing at 1750° F., it has a yield strength of 45,000 psi. and elongation of 35%. It is transformed at −100° F. after which it has a room-temperature yield strength of 110,000 psi. Final aging treatment is at 950° F. for a room-temperature yield strength of 200,000 psi. and ultimate strength of 240,000 psi. with elongation of 5%. (T24, 17-57, Q27; SS)

425-T.* (French.) **Alloys With High Nickel and Chromium Content for Electric Resistances.** A. Villachon. *Metallurgie et la Construction Mecanique,* v. 90, Sept. 1958, p. 643-655.

Properties, principal grades, characteristics, methods of test, precautions in use, deterioration, origin of principal impurities, temperature in use, calculation of a heating element, choice of alloys. Wire and strips. 16 ref. (T1p, 17-57; Ni, Cr)

426-T.* (Italian.) **Cermets, Ceramics and Protective Coatings for High-Temperature Applications in Jet Propellers.** R. M. Corelli. *Aerotecnica,* v. 38, Apr. 1958, p. 71-87.

Production methods, principal characteristics, methods of application (in case of coverings), performance. 27 ref.
(T24b, 17-57; SGA-h, 6-70)

427-T. (Czech.) **Welded Edges on Knives for Excavating Equipment for Coal Mines.** Jan Kolar. *Zvaranie,* v. 7, Aug. 1958, p. 234-237.

Experimental use of weld metal with different C, Mn, Si, Cr, W, V, Mo and Co content. Method of welded edges not successful, even when soft and medium hard coal was mined. (T28, 8-68, 17-57)

428-T.* **A Specialist's Way of Making a Way.** O. C. Underhill. *Machinery,* v. 65, Oct. 1958, p. 142-145.

Construction of flat bearings using two different materials to insure accuracy for sliding members in many machine tools. (T7d, W25)

429-T.* (German.) **Can Ceramic Tools Replace Tools of Hard Metal?** F. Kolbl. *Planseeberichte für Pulvermetallurgie,* v. 6, Aug. 1958, p. 48-66.

Ceramics based on aluminum oxide, aluminum oxide with chromium oxide, metals, metal carbides and borides. Properties and cutting speeds. Applications: spinning quartzite and caolinite, cutting hard rubber, lead bronze bearings, plastics, presintered ceramics and gray cast iron. 22 ref. (T6n, 17-57; 6-70)

430-T.* (German.) **Modern Hammer Drills.** O. Muller. *Technische Mitteilungen Krupp,* v. 16, Sept. 1958, p. 66-71.

Weight, number of blows per minute, air pressure, arrangement of water channels. One-piece boring bars and interchangeable boring heads, both with induction welded hard metal bore edges. Sintered tungsten carbide with Co is best. Co content from 7 to 15% determined by hammer type and kind of rock. 8 ref. (T28j; 17-57; 6-69)

431-T. **Aluminum Alloys.** Ralph L. Horst, Jr. *Industrial and Engineering Chemistry,* v. 50, Sept. 1958, Pt. 2, p. 1427-1432.

New Al-Mg alloys, corrosion, applications in buildings, nuclear reactors, chemical equipment, petroleum refining equipment and transportation equipment. 50 ref. (T-general, R-general, 17-57; Al-b, *Mg*)

432-T. **Industrial Material Roller-Bearing Steel and Its Importance for the Production of High-Grade Roller Bearings.** A. Naumann. *Technik,* v. 11, no. 11, Nov. 1956, p. 767-772. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1470.)

(T7d, 17-57; ST)

433-T. **AF Pushes Beryllium Studies.** Jack G. Conner. *Aviation Age,* v. 30, Sept. 1958, p. 102-109.

Pros and cons of Air Force use of Be for missile and spacecraft.
(T24e, 17-57; Be)

434-T. **Aluminum in Architecture.** A. F. Hare. *Modern Metals,* v. 14, Oct. 1958, p. 40, 43, 44, 46, 48, 49.

Applications, ranging from prefabricated homes and schools to huge domes, aircraft hangars and bridges. (T26n, T26p, 17-57; Al-b)

435-T. **Uranium. Pt. 1. Case for Enriched Uranium.** Chauncey Starr. *Nucleonics,* v. 16, Aug. 1958, p. 86-87.

Prospects for use of enriched U as reactor fuel. 6 ref. (T11g, 17-57; U)

436-T. **Uranium. Pt. 2. Case for Natural Uranium.** John R. Menke. *Nucleonics,* v. 16, Aug. 1958, p. 88, 95.

Use of natural U as reactor fuel. 12 ref. (T11g, 17-57; U)

437-T. **Thorium.** Bernard Manowitz. *Nucleonics,* v. 16, Aug. 1958, p. 91-95.

Use of Th as reactor fuel; Th-U^{233} fuel cycle. 12 ref.
(T11g, 17-57; Th, U)

438-T. **Ag-In-Cd Could Replace Hf for PWR Control Rods.** I. Coehn, E. F. Losco and J. D. Eichenberg. *Nucleonics,* v. 16, Aug. 1958, p. 122-127.

Ag-In-Cd is easily machined, less costly, suitable corrosion resistance. 7 ref. (T11j, 17-57; Ag, In, Cd)

439-T. **Fabrications in Nimonic Alloys With Particular Reference to Jet-Engine Components.** *Sheet Metal Industries,* v. 35, Aug. 1958, p. 630-635.

(T24b, 17-57; Ni-b)

440-T. **Rapid Evaluation of Cutting Tools.** L. B. Zylstra. *Tool Engineer,* v. 41, Oct. 1958, p. 117-118.

By using the facing method of testing with an engine lathe it is possible to quickly compare various cutting tools to see if extensive testing is justifiable.
(T6n, G17, 1-54)

441-T. (German.) **Complex Cutting Tools.** E. Bosse. *Fertigungstechnik,* v. 8, Sept. 1958, p. 393-396.

(T6n)

442-T.* (German.) **Wire as Material for Screens.** Erich O. Riedel. *Draht,* v. 9, Aug. 1958, p. 295-301.

Steels suited for screens and their composition. Survey of the effects of alloying elements on the proper-

ties of wire and on the resistance against H_2SO_4, HC_2 HNO_3. Wear testing machine illustrated. Excessive deformation of wire or even notching reduces strength up to 50%. Soldering intersections given preference to welding. Welding should be performed always under a protective gas to avoid decarburization. 5 ref. (T10, R6, Q9; ST, 4-61.)

443-T.* (German.) **Precious Metals and Their Alloys as Materials for Electric Contacts.** H. Holzmann. *Metall*, v. 12, July 1958, p. 630-636.

Requirements for electrical contact materials; various materials available (Cu, Ag, Au, Pt, Pd, Rh, In, B, Mo, and their alloys). Physical and electrical properties of the pure metals and a large number of alloys listed, advantages and disadvantages of the materials evaluated. Galvanic coatings discussed. (T1, 17-57; EG-c31, SGA-r)

444-T.* (German.) **Production of Spring Steel Wire for Motorcycle Springs.** Joachin Olden and Karlheinz Werner. *Neue Hütte*, v. 3, June 1958, p. 358-364.

One heat of spring steel of the type MK 82F was followed from melting furnace to actual tests after assembly on the motorcycle. For comparison Swedish spring steel was subjected to similar treatment. Warm forming, drawing tests, cold forming and coiling tests were carried out. German spring steel had same high-quality properties as Swedish steel. (T7c, 17-57; ST)

445-T.* Development of Micrograin Nickel. *Corrosion Prevention & Control*, v. 5, Aug. 1958, p. 56-58.

Micrograin Ni is hard, yet flexible and corrosion resistant. Resistance to abrasion and impact is unusually high, better than Ni deposited from solutions containing organic agents, or stainless steel. Advantages of protecting de-icers with micrograin Ni electroform. (T24a, 17-57; Q9n; Ni)

446-T.* Rudder Shafts for Missiles Made in Halves and Welded. Russell Meredith. *Machinery*, v. 65, Nov. 1958, p. 118-120.

Inconel "X" selected because it has good physical and mechanical properties at high temperatures and is highly resistant to corrosion and oxidation. Machining procedure is to slab-mill two forgings at a time on a conventional, horizontal milling machine, then contour-milling the various cavities, welding and heat treating.
(T24e, G17, K-general; Ni-b)

447-T.* Reactor Fuels and Materials Pioneering Work on Oxides and the New Metals. J. G. Ball. *Nuclear Power*, v. 3, Oct. 1958, p. 477-482.

Some 16 of the papers presented at the 2nd United National, International Conference on the Peaceful Uses of Atomic Energy are digested and analyzed. (T11g)

448-T.* Boron Containing Control Materials. D. N. Dunning, W. K. Anderson and P. R. Mertens. *Nuclear Science and Engineering*, v. 4, Sept. 1958, p. 402-414.

Boron stainless steel, Zircaloy-boron and Ti-B alloys for use in reactors. Fabrication techniques. 5 ref. (T11j, 17-57; SS, Zr, Ti, *B*)

449-T.* Boron Stainless Steel Alloys. L. B. Prus, E. S. Byron and J. F. Thompson. *Nuclear Science and Engineering*, v. 4, Sept. 1958, p. 415-428.

Several boron stainless steels containing 0.2 to 3.0% B investigated for possible use as a reactor control material. Fabrication methods, physical properties, wear and corrosion resistance of the alloys. (T11j, 17-57; SS, *B*)

450-T.* New Developments in the Fabrication of Hafnium Control Rods. J. Giacobbe and D. N. Dunning. *Nuclear Science and Engineering*, v. 4, Sept. 1958, p. 467-480.

Fabrication of strip Hf and strip Zircaloy by welding into suitable shapes applicable for reactor control. (T11j, 17-57; K-general, Hf, Zr)

451-T. Thorium-Uranium Fuel Elements for SRE. B. R. Hayward and P. Corzine. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/785, 1958, 13 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

One of major purposes of the Sodium Graphite Thermal Reactor Experiment (SRE) is to develop fuel materials for long burnup at elevated temperature. Development, processing and fabrication of Th-rich, Th-U alloys. Two major alloys were fabricated—5.4% U and 7.6% U. 5 ref. (T11g, 17-57; Th-b, *U*)

452-T.* (French.) **Properties and Applications of a Nickel-Sheathed Copper Wire.** *Revue du Nickel*, v. 24, July-Aug. 1958, p. 65-67.

Bimetallic conductor composed of electrolytic Cu coated with Ni combines high electrical and thermal conductivity of Cu with oxidation resistance and metallurgical properties of Ni; is fabricated in all diameters, with cross section 70% Cu, 30% Ni; is delivered hard or annealed. (T1, 17-57; Cu, *Ni*, 4-61)

453-T. Appraisal of Recent Metallurgical Advances in American Automobile Manufacturing. J. L. McCloud. *Metal Progress*, v. 74, Oct. 1958, p. 130-133.

Among the recent changes and those soon to come in materials for automotive use, the trends toward low-alloy and carbon steels and toward greater use of Al seem the most significant. (T21, 17-57)

454-T. Magnesium: Will It Find Biggest Market in Missiles? Carl N. Mortenson. *Missiles and Rockets*, v. 4, Sept. 8, 1958, p. 46-49.

Examples of the expanding application of ten Mg alloys. (T24e, 17-57; Mg)

455-T. Broad Aspects of Absorber Materials Selection for Reactor Control. W. K. Anderson. *Nuclear Science and Engineering*, v. 4, Sept. 1958, p. 357-372.

Selection of materials for control of nuclear reactors employing a variety of coolants and working over a broad range of neutron spectra considered from a qualitative standpoint. The materials discussed include hafnium, boron, cadmium, indium, silver, europium, gadolinium and samarium. 11 ref. (T11j, 17-57; Hf, B, Cd, In, Ag, Eu, Gd, Sm)

456-T. Nuclear Requirements for Control Materials. H. E. Stevens. *Nuclear Science and Engineering*, v. 4, Sept. 1958, p. 373-385.

Nuclear factors affecting the effectiveness of control rod materials for power reactors with a thermal or near-thermal neutron spectrum. Principal elements and isotopes which qualify as neutron absorbers are compared and physical requirements such as rod thickness, surface density and weight ratios noted. 4 ref. (T11j, 17-57, P18)

457-T. Use of Boron Carbide for Reactor Control. W. K. Barney, G. A. Sehmel and W. E. Seymour. *Nuclear Science and Engineering*, v. 4, Sept. 1958, p. 439-448.

Use of B_4C for the control of a sodium-cooled reactor considered from a design standpoint. Nuclear, mechanical and physical properties and irradiation data. 10 ref. (T11j, 17-57, 2-67; B, 14-68)

458-T. Development of a Composite Control Rod. G. W. Cunningham, A. K. Foulds, D. L. Keller and W. E. Ray. *Nuclear Science and Engineering*, v. 4, Sept. 1958, p. 449-457.

Scarcity and high cost of Hf for use as a reactor control material has led to the development of a composite control rod of Hf and B^{10}. Fabrication techniques. (T11j, 17-57; Hf, B)

459-T. Molybdenum as a Bearing Material. R. H. Warring. *Power Transmission*, v. 27, Sept. 1958, p. 548-550, 554.

(T7d, 17-57; Mo)

460-T. Your Guide to Springs That Store Energy Best. Karl W. Maier. *Product Engineering*, v. 29, Nov. 10, 1958, p. 71-76.

Energy depends on shape and material. Equations and tables that give definite comparisons between many candidates, materials. (T7c, Q-general, 3-73, 2-60)

461-T.* Role of Metallurgy in Atomic Energy Technology. Pt. 2. Fuels for Nuclear Reactors. A. Blainey. *South African Institute of Mining and Metallurgy, Journal*, v. 58, July 1958, p. 609-634.

Possibility of using natural U as a nuclear fuel has great significance for South Africa which has no separation plant for production of U^{235}. (T11g, 17-57; U)

462-T. Research and Development on Ultra-Thermic 500° C. Capacitors. A. L. Berg. Servomechanisms, Inc. (Wright Air Development Center), *U. S. Office of Technical Services*, PB 131848, Apr. 1958, 90 p. $2.25.

Ultra-thermic capacitors for operation to 500° C. were fabricated using successive layers of Pt and dielectric materials deposited by vacuum thermal evaporation. (T1e, L25, 2-61; Pt)

463-T. Feasibility Studies on Molten Metal Reactor Components. Ray W. Fisher and Charles B. Fullhart. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1032, 1958, 17 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Molten Mg-Th alloy of composition in the range of the Mg-rich eutectic was circulated in Ta at temperatures up to 800° C. Data indicated that Ta is a satisfactory material for containing molten Mg-Th alloys under temperature conditions that may be imposed on a molten blanket material in a nuclear reactor. 9 ref. (T11g, 17-57; Mg, Th, Ta)

464-T. Use of Aluminum as Fuel Cladding in High-Temperature Water Cooled Reactors. J. A. Ayres, R. L. Dillon and R. J. Lobsinger. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1430, 1958, 9

(*)Articles Available Through Photocopy Service; See Coupon, p. 91.

p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Corrosion rates of Al in high-temperature high-pressure water systems measured both inside and outside of a reactor. Equipment consisted of autoclaves, flow tubes and in-reactor flow loops.
(T11g, R11; Al, 8-66)

465-T. Liquid Metal Fuel Reactor With Recycled Plutonium. F. T. Miles, T. V. Sheehan, D. H. Gurinsky and H. J. C. Kouts. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/461, 19 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Fuel is a solution of the steady state mixture of Pu isotopes in Bi. The solution also contains U^{238}, Mg and Zr as corrosion inhibitors, and fission products. Fuel reprocessing includes degassing and extraction with molten salts, which is designed to keep neutron capture by fission products below 3%. 11 ref.
(T11g, P18; Pu, U, Mg, Zr)

466-T. Recycle of Plutonium in Low-Enrichment Light Water Reactors. P. Greebler, W. H. Harker, J. M. Harriman and E. L. Zebroski. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/2167, 1958, 39 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Detailed model of the physics of a reactor operating with recycle Pu fuel. Model takes into account spectral and geometric effects which must be considered for lattices in which the resonance region is important. Modes of operation available with Pu recycle. 19 ref.
(T11g, P18; Pu)

467-T. Material and Fuel Technology for an LMFR. C. J. Klamut, D. G. Schweitzer, J. G. Y. Chow, R. A. Meyer, O. F. Kammerer, J. R. Weeks and D. H. Gurinsky. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/2406, 1958, 58 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Materials which can be used in contact with U-Bi fuels in liquid metal fuel reactor systems (LMFR) are graphite, Be, carbon steels, low-Cr steels Mo, Ta, W and some high-alloy steels. Corrosion products resulting from immersion of these materials in U-Bi should not reduce the solubility of U in Bi. 36 ref.
(T11g, R6m; U, Bi, Be, CN, Mo, Ta, W, Cr)

468-T. (French.) **Copper Sheathing in Finnish Architecture.** Erkki Valve. *Cuivre, Laitons, Alliages,* no. 44, July-Aug. 1958, p. 11-15.
(T26n, 17-57; Cu-b)

469-T. (French.) **The New Roof of the Copper Information Center in Paris.** *Cuivre, Laitons, Alliages,* no. 44, July-Aug. 1958, p. 17-19.
(T26n, 17-57; Cu-b)

470-T. (French.) **Copper Cooking Utensils.** *Cuivre, Laitons, Alliages,* no. 44, July-Aug. 1958, p. 21-24.

Strong case for Cu as ideal metal for food preparation. Care and cleaning hints. (T10a, 17-57; Cu-b)

471-T. (German.) **Hexagonal Hard Metal End-Milling Cutter.** Hans-Jorn Burmester. *Industribelatt,* v. 58, Sept. 1958, p. 379-383.

Novel end-milling cutter provided with exchangeable hard metal blades that are discarded after using. Applications: milling of steel, steel castings, gray cast iron. 4 ref.
(T6n, G17b; 6-69)

472-T. (German.) **Platinum Metals Utilized as Catalysts.** J. Sagoschen. *Metall,* v. 12, July 1958, p. 604-611.

Survey of historic development, theory, production methods and applications. 139 ref. (T29d, 17-57; Pt)

473-T. (German.) **Hard Metal Tools for Precision Work.** Hans-Jorn Burmester. *Schriftenreihe Feinbearbeitung,* no. 29, 1958, p. 9-55.

Hard metal precision tools classified as one-edge machining tools, multiple-edge machining tools and tools for plastic deformation. 20 ref. (T6n; 6-69)

W Plant Equipment

495-W.* (French.) **Contribution to the Study of Rolling Mill Equipment. Pt. 2. Rolling Trains. Sec. 7. Sheet and Plate Mills.** G. Grenier. *Mines et Metallurgie,* June 1958, p. 365-367.

Plate and sheet products classified in four groups, according to thickness; types of rolling trains used in each case; sequence of concomitant operations (chipping, reheating, straightening, shearing, heat treatment, etc.) (W23, 1-52)

496-W.* (French.) **Study of Thomas Converter Bottoms.** Paper presented at Apr. 25, 1958, meeting of Association of Engineering Graduates, University of Liege. W. Kohler, Th. Hartman and G. Tromel. *Revue Universelle des Mines,* v. 14, Aug. 1958, p. 259-260.

Techniques of vibrating in mold and effects of vibration on distribution of material; study of fired and unfired bottoms. Effect of composition of iron processed in converter, of condition of joint between bottom and lining and other factors on bottom life. Heating and cooling of bottoms during converter operation. (W18k; RM-h)

497-W.* (French.) **Vibration of Converter Bottoms by Means of a Vibrator plate in French Steel Mills.** Paper presented at Apr. 25, 1958, meeting of Association of Engineering Graduates, University of Liege. J. de Hedonville. *Revue Universelle des Mines,* v. 14, Aug. 1958, p. 260.

Vibrator plate consists of table resting on supports under which vibrators are attached. Sole-plate and form are placed on top of table without any type of fastening. A grid to hold pipes in position is placed on top of form. Principal advantage of vibrator tables is great simplicity of installation and use. They permit manufacture of bottoms of different diameters and hole arrangement. Can also be used for making bottoms with Mg pipes. Life of bottoms vibrated by this technique is at least equal to that of rammed bottoms. (W18k; RM-h)

498-W.* (French.) **New Methods of Firing Bottom Joints in Thomas Converters.** Paper presented at Apr. 25, 1958, meeting of Association of Engineering Graduates, University of Liege. Legrandjacques, De Rousiers and Delong. *Revue Universelle des Mines,* v. 14, Aug. 1958, p. 260.

Use of mazout burners; burners fed by coke plant gas; burners fed by blast furnace gas; electrical heating. (W18p; RM-m)

499-W.* (French.) **New Method of Vibrating Converter Bottoms.** E. Glaesner. *Revue Universelle des Mines,* v. 14, Aug. 1958, p. 261-269.

Technique of top vibration by means of a plate into which are fitted rods covering pipes. Plate transmits vibrations to rods only, and these in turn to surrounding mass. Transference of vibration is highly efficient and uniform and maximum settling of dolomite mixture is achieved. This technique (which replaced system of lateral vibration), plus increase in height of bottom and use of Cu instead of steel pipes, increased bottom life by about 50%. In addition, use of a powerful burner fed by blast furnace gas for firing linings made it possible to pour instead of ram joints of first bottoms; life of latter has increased to point where it exceeds that of subsequent bottoms.
(W18p; RM-h)

500-W.* (French.) **Unfired Converter Bottoms at the Societe Cockerill-Ougree's Thomas Steel Works in Seraing.** R. Schuermans and J. Van Neste. *Revue Universelle des Mines,* v. 14, Aug. 1958, p. 270-279.

Bottoms are placed in converter without prior firing in dolomite shop, and are then fired simultaneously with joint. Increase in average life of bottoms is attributed to higher residual carbon content and lower porosity than in fired bottoms. Effect of duration of aging of unfired bottoms before placement in furnace. Preparation of bottom mold, processing of dolomite mixture, manufacture of bottoms; specifications of bottoms, sole-plates, operating conditions, dolomite consumption. (W18p; RM-h)

501-W.* (French.) **Manufacture of Dolomite Bottoms at Marchienne Works of Forges de la Providence.** M. Ledune. *Revue Universelle des Mines,* v. 14, Aug. 1958, p. 280-283.

Description of new dolomite shop, where particle size is closely controlled. Principal innovations are heating of 2-15 mm. diameter particles by infrared radiation in a rotary furnace; use of Eirich mixer equipped with 85-lb. wheel and agitators. Heating method avoids hydration, long-wave radiation permits deep heating of particles despite their high refractoriness. Best results have been obtained with bottom mixture composed of 62% particles of 2 to 15 mm. diameter and 38% filler 0-0.35 mm., with amount of tar added representing about 9% of total mass. Bottoms are poured, then vibrated laterally. Vibration permits use of drier mixtures (9% tar instead of 12%). Bottoms are not tubed. New methods have increased lining and bottom life about 50%. (W18p; RM-h)

502-W.* (Italian.) **New Venezuelan Steel Mill.** Massimo Gonni. *Metallurgia Italiana,* v. 50, June 1958, p. 215-245.

Initial capacity of integrated mill on Orinoco River, is 700,000 tons per yr., to be increased to 1,500,000 tons per yr. in future. Martin furnaces will be used. Details of installations, local supply of raw materials, production program. Blooming mill, motors and electrical equipment for rolling mills, Martin furnaces and pit furnaces. First seamless tube was rolled in April 1958. Construction scheduled for completion in June 1960.
(W10, W17, W23, 1-52; ST)

503-W.* (German.) **Plant Tests of Mill Casings.** Urmas Runolinna. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 11, Sept. 1958, p. 432-437.

Tests of ball and rod mill casings conducted at the Otanmaki plant which separates ilmenite from Finland's titaniferous magnetite. Advantages of using steel bars for casings instead of steel plates. Weight of ball mill casing was reduced by inserting 20-mm. wide wood beams between 80-mm. wide Cr-Mn steel bars. Further weight reduction and better wear results were obtained by replacing Cr-Mn steel bars with 30-mm. wide special Cr-Ni cast iron. (W15n, 17-57; CI, ST, Cr, Ni, Mn, 4-55)

504-W.* Power Quills Speed Output at Lower Cost. Ben C. Brosheer. *Metalworking Production,* v. 102, Oct. 10, 1958, p. 1781-1783.

For detailed precision drilling and reaming, precision milling, grinding and polishing with coated abrasive tools, with bonded grinding wheels or with either or tungsten carbide routing cutters, or with machine-ground burrs. (W25, 1-52)

505-W.* Bar Mill of Tomorrow. *Steel Equipment and Maintenance News,* v. 11, Sept. 1958, p. 6-7.

Automatic operations at new bar mill consist of uniformly heating 3 and 4-in. square steel billets and then passing them through a series of alternate vertical and horizontal stands. After the bars pass through 16-mill stand, they are run off onto one of two cooling beds where they are gradually cooled before being sheared into specified lengths for shipment. Bar mill furnace data given. (W23d)

506-W. Cupola Grit and Dust Arresters. G. E. Lunt. *British Cast Iron Research Association, Journal,* v. 7, Aug. 1958, p. 317-322.

Representative types of cupola grit and spark arresters, both wet and dry, available to the iron-founding industry. (W13c, E10a)

507-W. High Purity Oxygen for Steel Making. J. T. Hugill. *Canadian Journal of Chemical Engineering,* v. 36, Aug. 1958, p. 169-174.

One hundred ton per day oxygen units built for Dominion Foundries and Steel Co., Hamilton. 7 ref. (W10; ST, O)

508-W. Lighting for Metal Plating and Finishing. W. Robinson. *Electroplating and Metal Finishing,* v. 11, Sept. 1958, p. 311-315.

Light requirement for factory, plating shop, paint spraying; inspection; cost and maintenance. (W10, L-general)

509-W. Control of Electric Arc Furnace Electrodes. William Valachovic. *Industrial Heating,* v. 25, Sept. 1958, p. 1713-1714, 1716, 1893-1894, 1896, 1898, 1900.

Electrode regulating system and electrode driving motor as factors in arc furnace performance. (W18s)

510-W. Automatic Load Control in Electric Melting Furnaces Decreases Power Costs. *Industrial Heating,* v. 25, Sept. 1958, p. 1728, 1744.

(W11s, W18s, 18-74)

511-W. Bloom Reheat Furnace of Continuous Type Minimizes Hot Steel Handling. *Industrial Heating,* v. 25, Sept. 1958, p. 1736, 1744.

Consisting of nine barrel-type units, the furnace forms an integral portion of the conveyer system between blooming mill and rail mill, eliminating two handlings of hot steel by mechanical manipulator. (W20h, 4-52)

512-W. Continuous Furnace of Unique Design Heats Copper Billets for Piercing. W. A. Darrah. *Industrial Heating,* v. 25, Sept. 1958, p. 1778-1780, 1784.

Continuous feeding furnace with new heating chamber design and arrangement for firing to achieve rapid heating and uniform billet temperature. Eliminates handling and formation of scale during transfer period. (W20h, 1-61; Cu, 4-52)

513-W. Modern High-Speed Continuous Annealing Line for Tin Plate Scheduled at J & L's Aliquippa Works. *Industrial Heating,* v. 25, Sept. 1958, p. 1782, 1784.

(W27, J23, 1-61; ST, *Sn,* 8-65)

514-W. Four Slides Ease Complex Forming. *Steel,* v. 143, Oct. 13, 1958, p. 120-121.

Vertical version of four-slide forming machine simplifies setup and operation. (W24)

515-W. On the Deterioration of Quenching Oils. Masayoshi Tagaya and Imao Tamura. *Osaka University, Technology Reports,* v. 7, Oct. 1957, p. 403-424.

12 ref. (W28p)

516-W.* Forging Huge Crankshafts. Charles H. Wick. *Machinery,* v. 65, Oct. 1958, p. 113-116.

Giant crankshafts and other massive forgings are produced from SAE 5046 steel by 50,000-lb. steam drop hammer. Installation has three hydraulic presses for sizing, bending and trimming. (W22n, 1-52; AY)

517-W.* (German.) **CTIF Recuperator for the Hot Blast Cupola.** Georges Ulmer. *Giesserei,* v. 45, Sept. 11, 1958, p. 531-541.

New type recuperator forms a part of the furnace itself added to its top and shaped like a double-wall chimney. The blast air is heated between the ribbed inner wall and the outer wall. Combustion of gases inside the recuperator is adjusted by a burner on the bottom and a chimney damper on the top. In this way, and by controlling the quantity of air to be preheated, efficient operation of furnace and recuperator is provided. (W18d)

518-W.* (German.) **New Vibratory Process of Ramming Converter Bottoms.** Ernest Glaesener. *Stahl und Eisen,* v. 78, Aug. 21, 1958, p. 1169-1175.

Converter bottoms of increased lifetime can be produced by a new vibrating method whereby the dolomite-tar mixture is bound uniformly by vibrating rods within the blow holes. Additional heating of the preheated mixture, before final vibrating. Bottoms produced by this method proved to be more durable than those bound by other ramming or vibrating processes. (W18p; RM-h)

519-W.* (German.) **Deposits in Checker Chambers of Openhearth Furnaces Caused by Smelting Large Quantities of Scrap.** Otto Darmann and Gustav Mahn. *Stahl und Eisen,* v. 78, Aug. 21, 1958, p. 1176-1180.

When large quantities of galvanized iron scrap are smelted, slag deposits form in the checker chambers which affect performance and lifetime of the furnace. The slag contains up to 50% ZnO and can be reduced with CO, top gas, city gas and producer gas, which makes it possible to increase the economy of a furnace if top gas is applied regularly. (W18r, D11q; RM-p, RM-q)

520-W.* (German.) **Unbaked Converter Bottoms in the Basic Steel Plant of the S. A. Cockerill-Ougree.** Roger Schuermans and Jaques Van Neste. *Stahl und Eisen,* v. 78, Sept. 18, 1958, p. 1308-1313.

Plant experiments with converter bottoms from a dolomite-tar mixture. A 2% manganite (MnO_2) addition exerts a polymerizing influence on the formation of coked residues. The bottoms were vibrated, aged over several weeks, built into the converter and only then baked with a fuel oil flame. A durability from 80 to 100 melts was reached. (W18p; RM-h)

521-W. Modern Wire Rolling Mills. O. Wilmes. *Draht (English Edition),* no. 36, Aug. 1958, p. 15-18.

(W23, 4-61)

522-W. Adapting a Core Oven to Aluminum Heat Treating. Carl Mayer. *Foundry,* v. 86, Oct. 1958, p. 125.

Economies realized by a combination core baking and Al aging oven. (W19k, W27, J27a; Al-b)

523-W. Merchant and Wire Rod Mill. Leo Walter. *Iron and Steel,* v. 31, Oct. 1958, p. 485-490.

Fully continuous plant at Klöckner-Huttenwerke Haspe A. G. (W23d, 1-52; 4-61)

524-W. Automatic Fuel Control. *Iron and Steel,* v. 31, Oct. 1958, p. 507-508.

Design and construction of a new bloom reheating furnace for the Ormseby rolling mill at the Cargo Fleet iron-works of the South Durham Steel and Iron Co., Ltd. (W20h)

525-W. Contribution to the Study of Thin-Walled and Thick-Walled Blast Furnaces. J. Libricky. Paper from "Advances in Steel Technology in 1956", United Nations, 1958, p. 49-56.

Czech progress. (W17g, 17-51)

526-W. Areas of Application and Operating Results of the Short Rotary Furnace. W. Schwartz. *Metall,* v. 10, no. 3-4, 1956, p. 113-116. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1485.)

(W18b)

527-W. Determination of the Main Measurements of Siemens Martin Furnaces. S. Cernoch. *Neue Hutte,* no. 3, Jan. 1956, p. 150-156. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

(W18r)

528-W. Difficulties in Controlling Furnace Pressure. R. Jeschar. *Stahl und Eisen,* v. 20, Oct. 4, 1956, p. 1284-1289. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 241-F, 1956. (W20h, S18r)

529-W. Geometry of the Lower Part of an Ingot. L. V. Andreyuk. *Stal',* v. 17, Jan. 1957, p. 35-38. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 473-W, 1957. (W19c, 1-52; ST)

(*) **Articles Available Through Photocopy Service; See Coupon, p. 91.**

530-W. New Cast Irons for Rolls. H. Goebel. *Stahl und Eisen,* v. 77, Feb. 7, 1957, p. 143-157. (British Cast Iron Research Assoc., Alvechurch, Birmingham, Translation no. 826.)

Previously abstracted from original. See item 127-W, 1957. (W23k; CI, 17-57)

531-W. (French.) **International Research on Thomas Converter Bottoms.** Papers presented at Apr. 25, 1958, Meeting of Association of Engineering Graduates of University of Liege. *Revue Universelle des Mines,* v. 14, Aug. 1958, p. 259-283.

Manufacture of bottoms; vibrating and firing practices; unfired bottoms; bottom life. Papers abstracted separately. (W18p; RM-h)

532-W. (Italian.) **Melting Furnaces for Zinc Alloys.** Turno di Michelis. *Fonderia,* v. 7, Aug. 1958, p. 349-355.

(W18, E10; Zn-f)

533-W.* Railroad Car Rebuilt and Repaired at Kaiser's Fontana Works. A. B. Stoker. *Iron and Steel Engineer,* v. 35, Aug. 1958, p. 132-137.

Steel plant shop designed and rebuilt railroad cars more durable and better adapted to their needs than could be purchased. Main cause of damage occurred during loading and unloading of materials by magnet and damage was increased by accumulation of nonmagnetic materials in bottom of cars. Gondola, flat, and dump car construction. (W12p, W12s, 18-72)

534-W. (Russian.) **Use of Heat Resistant Stainless Steels in Power Plants Operating Up to 600° Steam Temperature.** E. S. Ginzburg. *Metallovedenie i Obrabotka Metallov,* June 1958, p. 47-52. (Henry Brutcher, Altadena, Calif., Translation no. 4254.)

Although stainless steel with 12% Cr meets general requirements for power plant service, it is limited in use to 420-480°. Results of extensive tests indicate that alloys EI747 and EI748 are suitable for turbine blades operating between 565 and 600°. 7 ref. (W11g, 17-57; SS, SGA-h)

535-W.* The Steam Jet Ejector: A Versatile Pump for High Vacuum. V. V. Fondrk. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 88-94.

Performance characteristics, installation, operating and maintenance costs, typical installation on consumable electrode vacuum melting furnace. Use of ejectors on stream degassing units presently operating in various steel mills and foundries in this country. (W13d, W18s, 1-73)

536-W.* (German.) **Modern Machines in the Light Metal Industry.** *Aluminium,* v. 34, Sept. 1958, p. 545-547.

An automatic gang press, a columnless heavy press, a hydraulic deep drawing press and an impact extrusion press for nonferrous metals. (W24g, 1-52; EG-a39)

537-W. One Man Handles Flexible Heat Treating Line. F. V. Horak. *American Machinist,* v. 102, Oct. 20, 1958, p. 142-143.

(W27, W28n, 18-74)

538-W. New Roller Hearth Annealing Furnace With Electronic Control. *British Steelmaker,* v. 24, Oct. 1958, p. 330-331, 328.

Used for the heat treatment of stainless steel tubes on either a continuous or batch production basis. (W27g, J23; SS)

539-W. Cast Iron Sectional Boilers. Jan Severa. *Czechoslovak Heavy Industry,* no. 9, 1958, p. 22-24.

Efficiency of various boilers using different fuels. (W11h, 1-52; CI, 17-57)

540-W. Oven Installation Bakes Paint on Metal Parts. *Industrial Finishing,* v. 34, Oct. 1958, p. 40, 44.

(W4k)

541-W. Factors in the Design of a Steel Plant Power System. A. J. F. MacQueen. *Iron and Steel Engineer,* v. 34, Oct. 1958, p. 92-100.

(W11g, 17-51, D-general)

542-W. A Survey of General and Specialized Machine Tools for Press-Tool Production. J. A. Waller. *Sheet Metal Industries,* v. 35, Aug. 1958, p. 595-602.

(To be continued.) (W25)

543-W. A Survey of General and Specialized Machine Tools for Press-Tool Production. J. A. Waller. *Sheet Metal Industries,* v. 35, Oct. 1958, p. 775-781, 791.

Types of milling machines including special types of machine which, in addition to normal milling, can affect other operation. (To be continued.) (W25r)

544-W. A Modern Melting Process for the Production of Metals and Alloys of Highest Purity. W. Scheibe. *Metall,* v. 11, 1957, p. 854-859. (Henry Brutcher, Altadena, Calif., Translation no. 4241.)

Previously abstracted from original. See item 212-W, 1958. (W18s, X24f; 1-73)

545-W. World's Biggest Continuous Casting Plant for Steel. V. V. Ful'makht. *Metallurg,* no. 6, June 1958, p. 15-17. (Henry Brutcher, Altadena, Calif., Translation no. 4343.)

Previously abstracted from original. See item 414-W, 1958. (W10a, D9q; ST)

546-W. (French.) **Vacuum Melting Furnaces With Consumable Electrodes.** H. Gruber. *Metallurgie et la Construction Mecanique,* v. 90, Sept. 1958, p. 673-695.

History of process, description of furnaces using consumable electrodes. Possible future developments of this type of furnace. Application and results in metallurgy. (W18s)

547-W. (German.) **Technical Directives of the Five-Year Plan for Foundries.** W. M. Schestopal. *Freiberger Forschungshefte,* v. B24-3, 1958, p. 84-112.

Production engineering and floor plans. (W19, E-general; 18-67)

548-W. (German.) **Gutterless Low-Frequency Induction Furnaces.** *Giesserei Praxis,* no. 17, Sept. 10, 1958, p. 342-343.

Uniform heating and melting procedures, perfect control of alloy composition. uniform quality of melt as well as relatively low installation costs and good productivity recommend this type of furnace for foundries. (W18a)

549-W. (German.) **Ideal Sliding Surfaces on Machine Tool Castings.** J. Tanner. *Giesserei-Praxis,* v. 18, Sept. 25, 1958, p. 367-368.

(W25, Q9p, 5-60)

550-W. (German.) **Air Heating Plants in the Metal Industries.** K. G. Muller. *Metall,* v. 12, Sept. 1958, p. 830-836.

Central and individual heating plants combining heat source and heat carrier used to heat drying ovens of paint shops. (W10e, W4k)

551-W. (German.) **Water Economy of the Hoesch-Westfalenhutte AG, Dortmund.** Maximilian Zur. *Stahl und Eisen,* v. 78, Aug. 21, 1958, p. 1191-1200.

(W10h; ST)

552-W. (Russian.) **Operation of Continuous Furnaces With Low-Pressure Burners.** D. E. Krasnozhen. *Metallurg,* v. 3, Sept. 1958, p. 23-25.

Burners are inadequately distributed. There is particular need for more burners in upper zones of furnace. Since there is no room to install additional burners, the need for greater heat can be met by enlarging nozzles of present burners. (W20h, 1-61, F21b)

553-W. (Russian.) **Industrial Frequency Induction Furnace for Annealing Copper Pipes Prior to Cold Bending.** I. K. Kopylov. *Vestnik Mashinostroeniya,* v. 38, Sept. 1958, p. 34-35.

(W27k, J23; Cu-b, 4-60)

554-W.* Aluminum-Bronze for Pump Construction. *Canadian Metalworking,* v. 21, Oct. 1958, p. 36, 38.

Corrosion and abrasion during pump usage are being overcome now that improved molding and pouring techniques have enabled the qualities of Al bronze to be utilized for machining. Ge properties of Al-bronze, high-Pb-Sn bronze (1103), cast steel (1201) and cast 316 stainless steel (1203); table of liquids which can be pumped with Al bronze. (W13d, 17-57; Cu-s, *Al*)

555-W. Recent Advances in the Metallurgy of Zirconium and Titanium Alloys of Special Interest in Reactor Technology. G. M. Adamson, J. O. Betterton, J. H. Frye and M. L. Picklesimer. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1993, 1958, 20 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Fabrication of Zircaloy-2 has been advanced by the development of a schedule which produces more nearly isotropic plate. Welding procedures now permit the field construction of complex structures of alpha Ti and perhaps Zr alloys. Zr alloys have been developed more resistant to radiation-induced corrosion in uranyl sulphate solution. 23 ref. (W11p, 17-57, F-general, K-general, R7k; Zr, Ti)

556-W. Metal Fibers Beef Up Plastic Dies. A. P. Maszucchelli. *American Machinist,* v. 102, Nov. 3, 1958, p. 94-95.

Longer wear, better heat properties and higher accuracy result when cast epoxy dies are filled with metal fibers. New technique where short fibers are flocked to outside wear surfaces improves die life. (W24n, H17; NM-d, 17-57)

557-W. Continuous Heat Treatment With Automatic Control. R. O'Donoghue and L. G. W. Palethorpe. *Automation Progress,* v. 3, Sept. 1958, p. 326-328.

Types of transfer furnaces; shaker hearth, rotating drum with helix walking beam, roller hearth. (To be continued.) (W27, W12r)

558-W. Electric Furnace Developments. P. F. Hancock. *Birmingham Metallurgical Society Journal,* v. 38, Sept. 1958, p. 89-104.

Review of construction, principal applications of direct arc, induction, resistor melting furnaces, induction heaters. (W18, 16-61)

559-W. Hugh Vacuum Furnace for Degassing, Heat Treatment and Brazing of "Supermetals" at the North American Aviation Missile Plant. *Industrial Heating,* v. 25, Oct. 1958, p. 1944-1946, 1948, 1950, 1952.

(W27n; 1-73)

560-W. Supply-Voltage and Current Variations Produced by a 60-Ton 3-Phase Electric Arc Furnace. B. C. Robinson and A. I. Winder. *Institution of Electrical Engineers, Proceedings,* v. 105, Aug. 1958, p. 305-324.

(W18s, D5)

561-W. Aspects of Russian Engineering Industry. *Machinery (London),* v. 93, Oct. 15, 1958, p. 864-881.

Activities of the First State Ball Bearing plant.
(W10, W25, T7d, 18-74)

562-W. Gas Turbine Progress. R. Tom Sawyer. *Mechanical Engineering,* v. 80, Nov. 1958, p. 102-110.

(W11m, T21b, T24b; SGA-h)

563-W. Use of Automatic Machinery in the Spray Painting Field. J. Arthur Weed. *Metal Finishing,* v. 56, Nov. 1958, p. 68-69.

Electrostatic, airless spraying and reciprocating-type spray machines.
(W4j, W4g)

564-W. Bulk Handling of Metal Powders. A. E. Williams. *Metal Industry,* v. 93, Oct. 24, 1958, p. 349-351.

(W12c, A5a, 6-68)

565-W. High-Pressure High-Temperature Apparatus. *Metal Industry,* v. 93, Oct. 24, 1958, p. 354, 358.

Piston-cylinder apparatus with internal heater can be used to give pressures up to 50,000 atm. at temperatures of 5000° C.
(W22, 2-62, 3-74)

566-W. Heat Treatment in Restricted Spaces. *Metallurgia,* v. 58, Oct. 1958, p. 185-187.

Advantages of continuous furnaces—rotary hearth, vertical conveyor and rotating tube types.
(W27, 1-61)

567-W. Press Line Conveyors Raise Production. L. J. Kevitt and A. Weigl. *Metalworking Production,* v. 102, Oct. 17, 1958, p. 1834-1835.

(W12r, W24)

568-W. Repair of Large Bell of a Blast Furnace. V. A. Karasik. *Metallurg,* no. 5, May 1957, p. 8-9. (Henry Brutcher, Altadena, Calif., Translation no. 4333.)

Technique employing hard-facing for the repair of a damaged bell of a blast furnace suffering from gas leaks. (W17g; 18-71)

569-W. Conversion of Openhearth Furnaces From Oil to Gas Firing. V. P. Borodin. *Stal',* v. 17, no. 2, 1957, p. 124-129. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 479-W, 1957.
(W18r, 1-52; RM-m35, ST)

570-W. Life of Steel Ingot Molds. S. M. Bobrovskii and A. G. Nikolaev. *Stal',* v. 17, 1957, p. 84-88. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 477-W, 1957.
(W19c, 17-57, 1-52; ST)

571-W. (Czech.) **Improved Arc Starting in Automatic Welding.** Vladimir Sulc. *Zvaranie,* v. 7, July 1958, p. 207-208.

(W29, K1, 18-74)

572-W. (Czech.) **Electrical Welding Equipment in the USSR.** Zdenek Hadrousek *Zvaranie,* v. 7, July 1958, p. 208-211.

Survey of production of welding machinery in the USSR. 7 ref.
(W29)

573-W. (French.) **A Charge Preparation Station on the Charging Platform.** *Journal d'Informations Techniques des Industries de la Fonderie,* no. 96, May 1958, p. 5-8.

(W18d)

574-W. (French.) **Ejectors for Die Casting Molds. Standardization and Mass Production.** *Journal d'Informations Techniques des Industries de la Fonderie,* no. 96, May 1958, p. 11-12.

(W19g, E13)

575-W. (German.) **More Flexibility of Process and Increased Efficiency of a Multiple Wiredrawing Machine by Electronic Control.** Huppertz. *Draht,* v. 9, Aug. 1958, p. 302-304.

Regulation of speed in a three-step wire drawing machine by electronic control of the field circuits of motors driving the drawing reels.
(W24k)

576-W. (German.) **How to Avoid Unnecessary Transportation in the Foundry.** Werner Riege. *Giesserei,* v. 45, Aug. 14, 1958, p. 474-477.

(W19, W12, 18-67)

577-W. (German.) **Automatic Molding Machine.** Waldemar Gesell. *Geisserei,* v. 45, Oct. 9, 1958, p. 642-647.

Automatic loading by roller conveyors, routing and sequence controlled electro-pneumatically. Improved production sequence of uniform height. (W19, W12, 18-67, 18-74)

578-W. (German.) **Electromagnetic Separators for Barrel Finishing Plants.** G. Nickel. *Metalloberflache,* v. 12, May 1958, p. 152-154.

Separation of parts and polishing material by electromagnet. (W3b)

579-W. (German.) **Use, Manufacture and Heat Treatment of Alloy Cast Steel Rolls. Pt. 3.** Heinz Uhilitzsch and Gerhard Radomski. *Neue Hutte,* v. 3, Aug. 1958, p. 475-482.

10 ref. (W23k; 17-57, AY)

580-W. (German.) **Application and Advantages of Die Inserts.** W. Kick. *Werkstatt und Betrieb,* v. 91, Sept. 1958, p. 557-560.

(W19n, 1-52, 17-51)

581-W. (German.) **Machine Tool Automation in Great Britain.** F. Koenigsberger and J. K. Royle. *Werkstattstechnik und Maschinenbau,* v. 48, Sept. 1958, p. 461-468.

9 ref. (W25; 18-74)

582-W. (German.) **Economic Distribution of Acetylene in a Welding Shop.** Ed. Gutjahr. *Zeitschrift für Schweisstechnik,* v. 48, Oct. 10, 1958, p. 264-272.

(W29e, A5g)

583-W. (Italian.) **Machining of Metals by Hot Plastic Deformation. Pt. 12. The Recoil Hammer.** Romeo Giusfredi. *Rivista di Meccanica,* v. 9, July 19, 1958, p. 37-39.

Description of recoil hammer; use; advantages and disadvantages; comparison with single and double-acting hammers. (To be continued.)
(W25, G17)

584-W. (Russian.) **Modern Hot Blast Cupolas for Steel Melting Plants.** N. V. Zinov'ev. *Stal',* v. 18, Sept. 1958, p. 796-799.

(W18d; ST)

585-W. (Russian.) **Selecting the Main Parameters of an Electromagnetic Stirrer for Arc Furnaces.** N. S. Siunov, M. G. Rezin and A. I. Kholodov. *Stal',* v. 18, Sept. 1958, p. 802-806.

Experiments with 180-ton electric furnace made with a nonmagnetic steel casing. By correct selection of main parameters considerable economies were made in electrical energy. Capital cost of the installation was offset in 1.5 to 2 years.
(W18s, D5f)

586-W. (Russian.) **Increasing the Durability of Small Ingot Molds.** V. M. Tokarev. *Stal',* v. 18, Sept. 1958, p. 861-864.

New alloys which reduce weight of ingot molds. With introduction of smooth-walled molds their durability increased by 32.3%, and with use of ribbed walls, there was a further 10.3% in durability.
(W19c; ST)

Instrumentation

Laboratory and Control Equipment

92-X.* (German.) **Temperature Measuring Equipment.** H. Kluge. *Giesserei Praxis,* no. 16, Aug. 25, 1958, p. 316-319.

Importance of accurate temperature measuring for all installations producing or utilizing heat. Depending on temperatures involved or materials concerned, certain instruments can be used, operating on electrical, optical and sometimes chemical principles. Metals and metal-alloys which make up these devices decide range of temperatures within which devices can be applied. Resistance thermometers, thermocouples, pyrometers described. (X9)

93-X.* Width Meters Trim Strip Waste. *Steel,* v. 143, Oct. 20, 1958, p. 182, 185.

A width gage uses photocell detectors which follow the edges of the hot strip by the radiation they emit. Ectromechanical circuitry translates what the photocells see into a running record of strip width. A new width meter uses a split beam of light from a point source, instead of radiation from the strip itself, to monitor the width of the strip. (X20, W23c, 1-53)

94-X. Army Uses Sun. *Chemical and Engineering News,* v. 36, Oct. 13, 1958, p. 35-36.

Description of solar furnace, proposed applications. (X24f, 16-63)

95-X. An Instrument for the Measurement of Stress in Electrodeposits. T. P. Hoar and D. J. Arrowsmith. *Institute of Metal Finishing, Transactions,* v. 43, 1956-1957, p. 354-368.

Metal is deposited on one side of a thin metallic strip fixed at the bottom; to the top is attached a light armature of soft iron. The stress in the deposit is determined by measuring the current through a solenoid that provides a restoring force on the armature to prevent the strip from bending. 7 ref.
(X29q, Q25, 8-62)

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96-X. (French.) **Control of Atmospheres in Heat Treating Furnaces.** A. L. Forrester. *Chaleur et Industrie,* v. 39, June 1958, p. 159-166.

8 ref. (X7f, W27n)

97-X. (Italian.) **Determination of Total Water Content and Humidity in Electrode Coverings.** R. Botisk and F. Corbelli. *Rivista Italiana della Saldatura,* v. 10, Mar-Apr. 1958, p. 45-50.

Three methods (Gayly and Wooding, Jannasch and Fischer) used to determine total water content of basic electrode coverings; one (Gorbach) to determine humidity. Techniques and apparatus. (X21, W29h)

98-X. Automation of Cupola Charging and Stockline Control With the Use of Radioisotopes. G. K. Miroshnichenko. *Liteinoe Proizvodstvo,* no. 8, Aug. 1957, p. 14-15. (Henry Brutcher, Altadena, Calif., Translation no. 4341.)

Previously abstracted from original. See item 25-X, 1958. (X13f, W18d; 1-59, 18-74)

99-X. (German.) **New Developments in Radiography and Image Intensification.** Heinrich Nassenstein. *Schweissen und Schneiden,* v. 10, Sept. 1958, p. 376-379.

Xeroradiographic method, superconoscope, solid-state light amplifier. 11 ref. (X2, S19)

100-X. Total Radiation Pyrometers. *Castings,* v. 4, Sept. 1958, p. 32-34. (X9r, S16b)

101-X. New Techniques Revealed at West Coast Lubrication Conference. Ernest Rabinowicz. *Product Engineering,* v. 29, Nov. 10, 1958, p. 84, 85.

Radioactive tracers, interference microscopy, high-speed computers in bearing and lubrication research. (X3q, X14, T7d, 1-54, 1-59; NM-h)

102-X. A Large Metal System Permitting Low Base Pressures. J. Ralph Ullman. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, 1958, p. 95-96. (X13e, 1-73)

103-X. Production of Very Low Pressures With Getter-Ion Pumps. G. Reich and H. G. Noller. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, 1958, p. 97-99. (X13e, 1-73)

104-X. A Magnetic Amplifier Control Circuit for a Thermal Conductivity Vacuum Gauge. Allen R. Hamilton. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, 1958, p. 112-114. (X12p)

105-X. A New Type of Vacuum Leak Detector. F. L. Torney, Jr. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, 1958, p. 115-119.

Operational characteristics of halogen sensing elements and their influence on electronic circuit designs. Advantages. (X12s)

106-X. Apparatus for Measuring the Depth of Cracks. Lutz Brand. *Stahl und Eisen,* v. 77, May 2, 1957, p. 576-581. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB41.)

Previously abstracted from original. See item 53-X, 1957. (X8, 1-52, 9-72)

107-X. (German.) **Material Testing Instrument.** *Technik und Betrieb,* v. 10, July 1958, p. 103.

Steel tested with a thermocouple. (X9q, S11g; ST)

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METALLURGICAL ENGINEER: B.S. degree in mechanical engineering, age 35, mar-

ried, family. Twelve years in metals field with extensive experience and supervision in heat treating, including tools, carbon, stainless and low-alloy steel, controlled atmospheres, salts, etc. Would like position as heat treat supervisor or sales engineer. Will relocate. Box 12-60.

METALLURGIST: Graduate mechanical engineer. Thirty-nine years metallurgical experience in laboratory and shop with metals for machinery and tools used in five industries. Material selection, specifications, heat treatment, metal finishing, investigations. Supervision over 25 years. Available immediately, part or full time. Prefers location near Newark, N. J. Box 12-65.

POWDER METALLURGIST: Graduate metallurgist with eight years experience in field of powder metallurgy applied to bearing and structural parts fabrication. Successful background in sales engineering work in same field. Would like to be considered for post with progessive powder metal fabricator in production metallurgy and/or sales engineering. Box 12-70.

SALES ENGINEER: Licensed metallurgical engineer. Presently sales engineer, covering Northern Ohio area. Broad ferrous and nonferrous processing experience. Late 30's. Desires challenging sales engineering position in related field. Prefers Cleveland headquarters. Box 12-85.

PHYSICAL METALLURGIST: Age 24, single, B.S. degree in metallurgical engineering. One year practical steel mill metallurgy experience in openhearth and rolling mills. Experience as welding instructor. Desires position in general physical metallurgy, possibly development, leading to customer contact type work or sales engineering. Box 12-90.

METALLURGICAL ENGINEER: B.Met.E. degree, age 38. Fifteen years diversified experience in both ferrous and nonferrous, aircraft and commercial fabrication, specification, project investigation, customer and vendor contact. Desires challenging responsible position as metallurgical engineer or contact metallurgist. Box 12-95.